BATTLE OF THE ATLANTIC (1)

The U-Boat Campaign against Britain, 1939–41

MARK STILLE

ILLUSTRATED BY JIM LAURIER

CAMPAIGN 408

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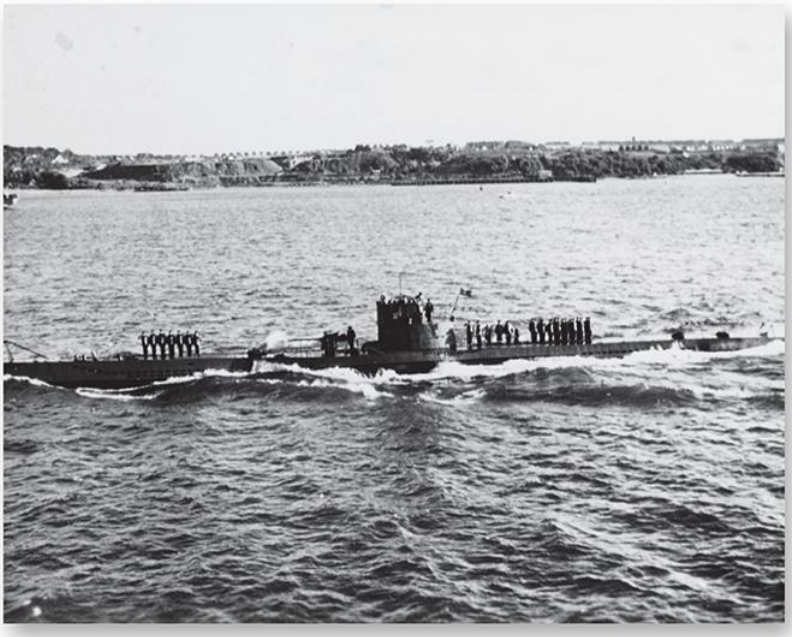

MARK STILLE

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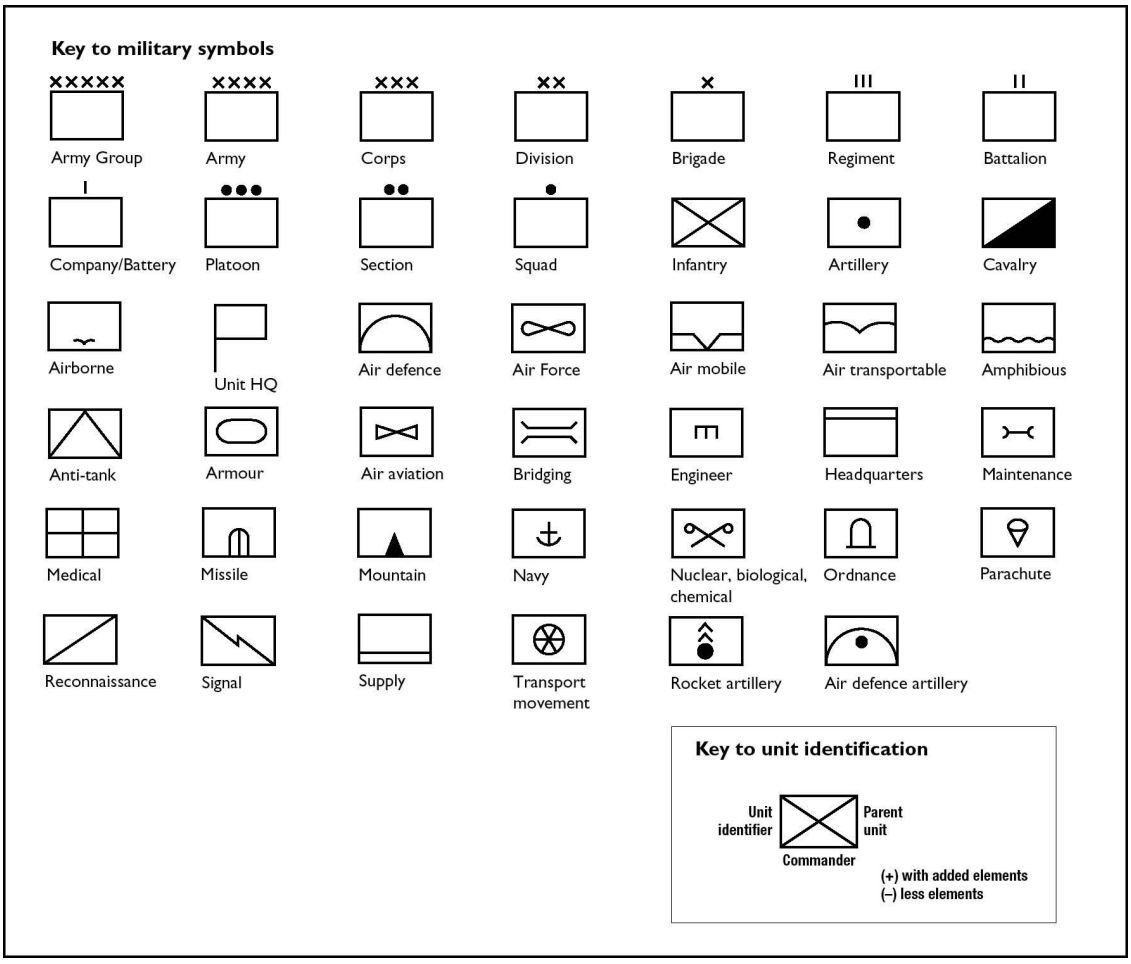


INTRODUCTION

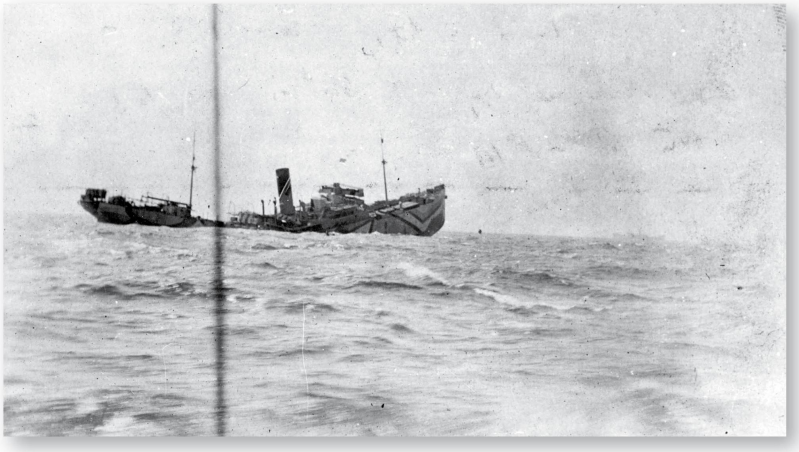
The so-called Battle of the Atlantic was actually the longest naval campaign of World War II. Fought between the Allies and the Germans, it was the most important and best-known naval campaign in the European theatre. Because of its expanse, complexity and duration, this account has been broken into several parts. This volume is the first of three that will examine the struggle between Allied naval and air forces and the German U-boat force in the Atlantic. This is something of an artificial division since the Germans were fighting a 'tonnage' war with the goal of sinking as many Allied merchant ships as possible using a variety of forces, not just U-boats, and in many areas besides the Atlantic. Focusing on the Atlantic will preclude detailed treatment of U-boat operations in other ocean areas. Other volumes will examine the German Navy's attempts to use large surface combatants as commerce raiders and its efforts to employ disguised surface raiders against Allied shipping.

ORIGINS OF THE CAMPAIGN

Before World War I, the Germans spent enormous resources on a battle fleet built around state-of-the-art dreadnoughts to challenge the power of the Royal Navy (RN). The German battle fleet proved of little use during the war, being bottled up in the North Sea. Meanwhile, the RN instituted a stifling blockade of German ports, which had the long-term aim of strangling Germany and its war effort. Given the inability of the German fleet to threaten British control of key sea areas or to attack British commerce, the U-boat (*Unterseeboot* shortened to *U-Boot*) became the German Navy's primary striking force.

The Germans first used U-boats to attack British shipping in October 1914. By an agreed convention among the maritime powers, these attacks were to be conducted under 'prize regulations', which required the U-boat to surface

in order to remove the crew and passengers and move them to ‘a place of safety’ (for which lifeboats did not usually qualify) before sinking the ship. Such a procedure left the U-boat in an extremely vulnerable position and eliminated all the strengths of a submarine. In practice, German U-boat commanders did not always adhere to prize regulations, even early in the war. Making the use of prize regulations even more problematic was the British tactic of deploying Q-ships, which were merchant ships equipped with hidden guns used to lure the unsuspecting U-boats to their demise.



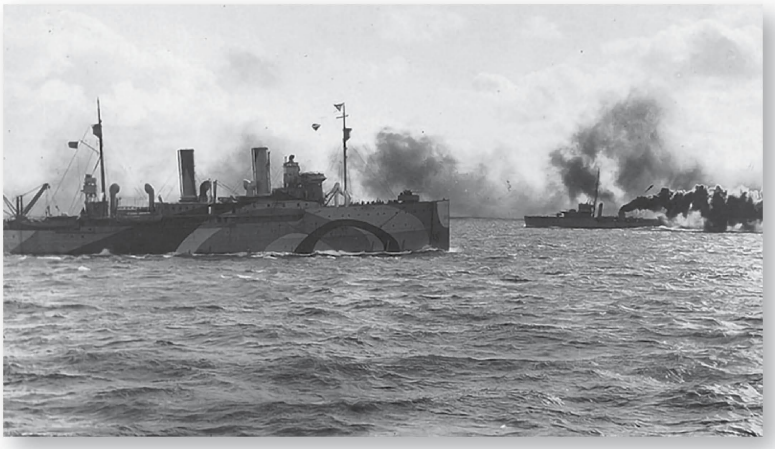
In an all too familiar sight from World War I, British steamship SS *City of Glasgow* sinks after being torpedoed in the Irish Sea on 1 September 1918. Note the ship is painted in dazzle camouflage, a tactic that was not as widely repeated in World War II. During the first Atlantic campaign of World War I, U-boats sank some 12.5 million Gross Register Tons (GRT) of Allied and neutral shipping, almost bringing the Allied war effort to collapse. (Naval History and Heritage Command)

Under prize regulations restrictions, it was impossible for the Germans to achieve decisive results against British shipping. In an attempt to starve Britain before the British blockade defeated Germany, on 4 February 1915 the Germans declared a blockade zone around Britain to pursue unrestricted submarine warfare. Merchant ships would be sunk without warning in this area. During this period, British counter-measures were immature and ineffective – there were no means to attack or even detect submerged U-boats. Despite good results in terms of ships (370) and tonnage (750,000) sunk, the Germans were forced to abandon their unrestricted submarine warfare campaign on 1 September 1915 after the loss of American ships and lives threatened to bring the United States into the war. The Germans simply

lacked the means to inflict decisive sustained losses on British shipping with only 37 submarines available at the start of the unrestricted warfare campaign.

After trying unsuccessfully to use their battle fleet more aggressively in 1916 and the failure of another restricted submarine warfare campaign under the prize regulations beginning in October of that year, the Germans decided to resume unrestricted submarine warfare on 1 February 1917. There was no other choice. The efforts of the U-boats from 1914 to 1916 were ineffective. By the end of 1916, Britain's Merchant Navy was still 94 per cent of the size it was at the start of the war. Now the Germans assessed that if they could sink 600,000 GRT of shipping per month for five months, Britain would be forced to negotiate for peace by August.

At the start of the new campaign, the Germans had 105 U-boats. Even though not all of these were available or suited to operations in the Atlantic, this gave the Germans hopes for success. The U-boat force reached a peak of 129 boats on 1 June 1917. Early results were encouraging. In February, 414,000 GRT were sunk in the waters around Britain, with the total tonnage sunk in all areas coming to 540,412. In the following month, losses around Britain rose to 500,000 GRT of the total of 564,497 GRT lost. In April, losses reached crisis proportions of 860,334 GRT lost overall, with 600,000 GRT sunk in British waters. Only nine U-boats were lost in the first three months of the campaign, and in April, the exchange rate was 167 merchants sunk for every U-boat lost. Had losses continued at this pace, the British would have been compelled to make peace by November. However, this early success came at a price when the US entered the war on 6 April. This was not unexpected, but the Germans made the calculation that they could defeat the Allies before the US could mobilize and send a significant number of troops to Europe.



One of the measures undertaken by the Allies during World War I was to establish a mine barrier to prevent U-boats from exiting the North Sea. In this view from 1918, American minelayer USS *Shawmut* lays mines under cover of a RN destroyer. German control of Norway in World War II prevented a repeat performance by the Allies in the second Atlantic campaign. German possession of bases in France made the U-boat threat much more significant in World War II. (Naval History and Heritage Command)

The British responded slowly to the U-boat peril. In particular, the RN resisted the call for instituting convoys. There were many reasons, primarily based on the supposed lack of escorts and the vulnerability of the convoys to detection and attack. Probably the biggest argument rested on the RN's reluctance to assume a 'defensive' stance by resorting to convoys. In fact, convoys offered a greater chance to attack U-boats. It reduced the number of targets available to the U-boats, and when convoys were detected, it made the U-boats attack the most heavily defended spots in the ocean. So deep was the reluctance to adopt convoys, that in December 1917 with losses mounting, the First Lord of the Admiralty was forced to dismiss Admiral John Jellicoe from his post as First Sea Lord in part for his opposition to the institution of the practice.

In spite of this resistance, desperation forced the introduction of convoys beginning in May. It took many months to organize all shipping into convoys, but losses began to fall almost immediately. Within the first three months of convoying, just 27 ships of the 8,894 in convoy were lost. However, not all ships were organized this way – in the same period 365 ships were lost as they proceeded independently.

Beginning in May 1917, the British instituted transatlantic convoys. Until the end of the war, just over 1 per cent of ships in convoy headed to England

were sunk (104 out of 9,250); for outbound convoys, the losses were even lower (0.68 per cent) with 50 out of 7,289 ships being lost. These figures include 36 ships that failed to keep up with their convoy (becoming stragglers) and another 16 lost to weather. More than any other factor, convoys defeated the U-boats in World War I. Losses for the remainder of 1917 went down from a high of 696,725 GRT in June to a low of 302,599 GRT in November.

As losses in the Atlantic decreased, the Germans concentrated on attacking shipping in the Mediterranean in order to reach their 600,000 GRT per month goal. Because use of convoys was less prevalent in the Mediterranean, shipping losses there remained high and, in 1918, accounted for nearly a third of all shipping losses. After the Allies introduced convoys to the Mediterranean on a widespread basis, the Germans once again switched tactics by concentrating on attacking shipping in British coastal waters after convoys dispersed and the ships headed to their individual ports. Eventually, enough escorts were found to create coastal convoys and by the end of the war almost all shipping was convoyed. In coastal areas, the use of aircraft proved extremely useful. Their presence near a convoy was sufficient to force a U-boat to submerge, greatly reducing its effectiveness.

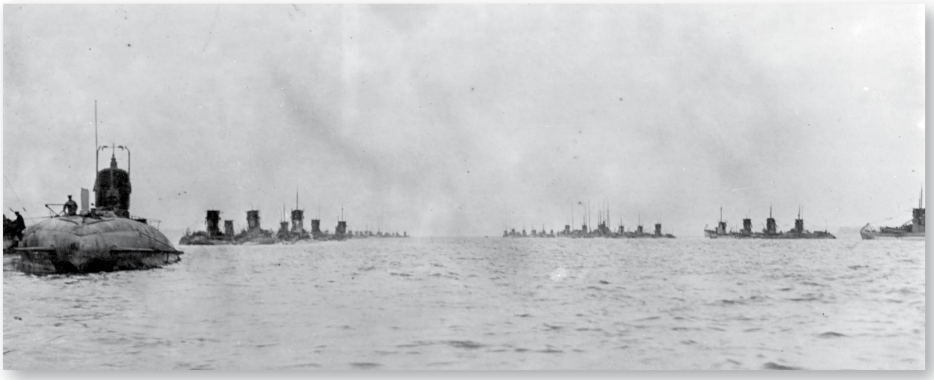
In addition to convoys and Q-ships, many other measures were introduced to neutralize the U-boat threat. Direction-finding stations were used to locate U-boats when they communicated so that convoys could be steered away from them. Late in the war, sonar (an underwater locating device that uses sound waves) and depth charges (an explosive charge dropped into the water and set to explode at a pre-determined depth) were introduced. Mines also proved to be a formidable weapon. A mine barrier was laid across the Strait of Dover to close the English Channel as a transit route to the key South-West Approaches to Britain. By February 1918, the barrier had destroyed enough U-boats to force all but the small U-boats based in Belgium to transit around Scotland instead of using the English Channel. In 1918, the Allies, led by the United States Navy (USN), attempted to establish a mine barrier across the southern Norwegian Sea to block U-boat access to the Atlantic via the northern route. The North Sea Mine Barrage was not completed before the end of the war, but six U-boats were sunk as a result.

Owing to all these measures, in 1918, the U-boat threat was largely contained. In the Atlantic, losses in January amounted to 98 ships of just 170,000 GRT with total U-boat losses reaching 295,558 GRT. After a rise in

losses in February and March, shipping losses did not surpass 300,000 GRT for the remainder of the year. Germany's collapse in late 1918, in large measure due to the Allied naval blockade, meant an end to the U-boat war. On 20 October, the unrestricted submarine warfare campaign was ended; on 11 November, Germany surrendered.

Germany's submarine offensive against Britain's merchant and military fleets ultimately failed, but the cost had been very high. In total, some 12.5 million GRT of Axis and Allied shipping was sunk during World War I, over 8 million GRT in the Atlantic. The scale of these losses was enormous, but it failed to bring victory to the Germans. In return, the Germans lost 178 U-boats during the war, 153 of these in the Atlantic. Following the Treaty of Versailles in 1919, the German Navy was not allowed to design, build or possess submarines and was limited to a small force of obsolescent surface ships.

When Germany and the Allies headed into another war in 1939, Britain's North Atlantic lifelines again became a target. Using essentially the same types of submarines, the new German Navy again attempted to defeat Britain by attacking its vulnerable shipping. The Allies were confident that they had the means to defeat a renewed U-boat assault in the Atlantic. The second Battle of the Atlantic was ready to begin.



At the conclusion of World War I, the Germans were forced to surrender 122 U-boats; another 14 were scuttled. Enemy action accounted for another 178. This is a group of surrendered German submarines at Harwich after the war. (Naval History and Heritage Command)

CHRONOLOGY

1939

19–23 August	16 U-boats deploy to the North Atlantic.
3 September	Great Britain and France declare war on Germany.
	Germany begin the campaign with 57 U-boats of all types.
	Though U-boats are under orders to operate under prize regulations, *U-30* attacks and sinks passenger liner *Athenia* without warning, opening the Atlantic campaign.
6 September	RN institutes a convoy system.
17 September	*U-29* sinks carrier *Courageous*.
30 September	German submarines account for 41 merchant ships of 153,879 Gross Register Tons (GRT)[1] during the month.
14 October	*U-47* sinks battleship *Royal Oak* in Scapa Flow.
31 October	German submarines account for 27 merchant ships of 134,807 GRT during the month.
30 November	German submarines account for 21 merchant ships of 51,589 GRT during the month.
31 December	German submarines account for 25 merchant ships of 80,881 GRT during the month.

1940

31 January	German submarines account for 40 merchant ships of 111,263 GRT during the month.
28 February	German submarines account for 45 merchant ships of 169,566 GRT during the month.
31 March	German submarines account for 23 merchant ships of 62,781 GRT during the month.
9 April	Germany invades Denmark and Norway; most of the U-boat force is pulled from the North Atlantic to support the invasion.
30 April	German submarines account for seven merchant ships of 32,467 GRT during the month.

May	*Rösing* pack sinks 27 merchant ships.
31 May	German submarines account for 13 merchant ships of 55,580 GRT during the month.
June	First U-boat deployment to the South Atlantic.
8 June	Allies evacuate their last forces from Norway; U-boats have free access to Norwegian bases.
22 June	French seek armistice with Germany.
30 June	German submarines account for 58 merchant ships of 284,113 GRT during the month.
7 July	First U-boat arrives in Lorient, France; use of French bases gives U-boat force direct access to the Atlantic.
31 July	Axis submarines account for 38 merchant ships of 195,825 GRT during the month.
August	US 'loans' 50 old destroyers to Britain for use at British bases in the Western Hemisphere.
31 August	Axis submarines account for 56 merchant ships of 267,618 GRT during the month.
4 September	First Italian submarines arrive at Bordeaux, France, to assist in the Atlantic campaign.
6–8 September	Convoy SC 2 loses five ships to pack attack.
20–21 September	Convoy HX 71 loses 12 ships to pack attack.
30 September	Axis submarines account for 59 merchant ships of 295,335 GRT during the month.
16–19 October	Convoy SC 7 loses 16 ships to pack attack.
19–20 October	Convoy HX 79 loses 12 ships to pack attack.
31 October	U-boats reach their peak effectiveness during the 'Happy Time' in July–October; Axis submarines account for 63 merchant ships of 352,407 GRT during the month.
30 November	Axis submarines account for 32 merchant ships of 146,613 GRT during the month.
31 December	Axis submarines account for 37 merchant ships of 212,590 GRT during the month; for all of 1940, merchant losses to submarines total 471 ships of 2,186,158 GRT.
	At the end of the year, the German U-boat force grows to 89 boats of which 22 are operational with the remainder devoted to training or on trials.

1941

31 January	Axis submarines account for 21 merchant ships of 126,782 GRT during the month.

9–10 February	In the only operation of its kind during the campaign, German air, surface and submarine forces combine to sink 9 of 16 merchants in Convoy HG 53.
26 February	Fw 200 Condors sink seven merchant ships from Convoy OB 290, the highest daily total of the entire campaign.
28 February	Axis submarines account for 39 merchant ships of 196,783 GRT during the month.
March	US extends Lend-Lease to Britain allowing British to receive aid and pay for it later.
7 March	U-boat ace Günther Prien is killed.
16 March	Convoy HX 112 escorts under Donald Macintyre capture U-boat ace Otto Kretschmer and kill ace Joachim Schepke.
31 March	Axis submarines account for 41 merchant ships of 243,020 GRT during the month.
30 April	Axis submarines account for 43 merchant ships of 249,375 GRT during the month.
May	RN establishes first eight escort groups and creates Newfoundland Escort Force enabling continuous escort of convoys across the Atlantic; HX 129 becomes the first transatlantic convoy to receive coverage for its entire journey.
9 May	British capture *U-110* with an Enigma machine and code material.
19–20 May	Convoy HX 126 loses 12 out of 33 merchants; all future transatlantic convoys receive continuous escort.
Late May	Government Code and Cypher School at Bletchley Park is able to read the bulk of German Navy radio traffic with only a few hours delay.
31 May	Axis submarines account for 58 merchant ships of 325,492 GRT during the month.
23–29 June	In a major battle around Convoy HX 133 between 13 escorts and 10 U-boats, 11 merchants are lost in exchange for two U-boats.
30 June	Axis submarines account for 61 merchant ships of 310,143 GRT during the month.
July	American forces occupy Iceland.
25–27 July	Focus of U-boat operations shifts to convoys operating to and from Gibraltar; seven ships are lost from Convoy OG 69.
31 July	Axis submarines account for 22 merchant ships of 94,209 GRT during the month.
18–22 August	Convoy OG 71 comes under heavy attack, losing nine merchants and 2 escorts; no U-boats are lost.
31 August	Axis submarines account for 23 merchant ships of 80,310 GRT during the month.
4 September	American destroyer *Greer* and a U-boat exchange fire south of Iceland; USN ships now authorized to fire on U-boats whenever they are

	detected.
9–20 September	Convoys SC 42 and SC 44 come under heavy attack off Cape Farewell; 20 merchants and one escort are lost in exchange for 2 U-boats.
25–26 September	As action intensifies off the Mediterranean approaches, Convoy HG 73 loses nine merchants; no U-boats are lost.
30 September	Axis submarines account for 53 merchant ships of 202,820 GRT during the month.
17 October	American destroyer *Kearney* damaged by U-boat attack.
31 October	American destroyer *Reuben James* sunk by U-boat attack.
	Axis submarines account for 32 merchant ships of 156,554 GRT during the month.
30 November	Axis submarines account for 13 merchant ships of 62,196 GRT during the month.
7 December	Japan attacks Pearl Harbor, bringing the US formally into the war.
11 December	Germany declares war on the US; Dönitz prepares U-boats for deployment to the US East Coast.
16–23 December	Escorts for Convoy HG 76 defeat heavy attacks, sinking four U-boats; two merchants, one escort carrier and a destroyer are lost in return.
31 December	Axis submarines account for 26 merchant ships of 124,070 GRT in all areas during the month; for all of 1941, merchant losses to submarines total 432 ships of 2,171,754 GRT.
	At the end of the year, the German U-boat force grows to 249 boats of which 91 are operational with the remainder devoted to training or on trials.

The Wickes-class destroyer USS *Greer*, originally commissioned in 1918, was the first USN ship to engage German naval forces during the Atlantic campaign. In the *Greer* incident on 4 September 1941, *Greer* and *U-652* exchanged fire with neither side incurring damage. In response, President Roosevelt issued a 'shoot on sight' order to the USN, meaning that the Americans were effectively engaged in active hostilities. This is *Greer* later in the war on convoy duty in heavy Atlantic seas. (Naval History and Heritage Command)

NOTE

1 Tonnage for merchant ships is measured in Gross Register Tons (GRT), which is calculated by measuring all the enclosed spaces of a ship and allocating 100 cubic feet for one ton. When tonnage losses are provided in this book, they represent GRTs.

OPPOSING COMMANDERS

BRITISH

Winston Churchill was not a naval commander, but this did not stop him from acting as one. On 3 September 1939, the first day of the war, he returned to the post of First Lord of the Admiralty, the same post he had held in World War I. As such, he was the RN's political head. Churchill was constantly proposing new operations, some far-fetched and impractical, but some of value. The First Sea Lord Sir Dudley Pound, the professional head of the RN, would have to deal with these. He became expert in dealing with his political superior, and after a period of adjustment, the two developed a strong working relationship. In May 1940, Churchill left the Admiralty to become Prime Minister. He also retained the position of Minister of Defence, which required a continuing relationship with Pound.

Churchill was intimately involved with the RN's worldwide deployment, including operations in the Atlantic. As Minister of Defence, he was also responsible for the overall allocation of military resources and must bear responsibility for starving the Atlantic campaign of long-range aircraft during the opening phases of the campaign in favour of offensive operations against Germany. He coined the inaccurate term 'Battle of the Atlantic' (the Atlantic Campaign would be more apt) and his post-war writings bolstered the myth that Britain's survival was hanging by a thread at points in the war in the face of the U-boat threat, which was not accurate.

After a significant delay in instituting convoys to counter the U-boat threat in World War I, the RN almost immediately began convoying after war was declared on 3 September 1939. Both Prime Minister Churchill and First Sea Lord Sir Dudley Pound recognized that neutralizing the U-boat threat was essential for Allied victory. In this photo, Churchill and Pound are being greeted aboard the USN heavy cruiser USS *Augusta* before meeting with President Roosevelt off Newfoundland on 9 August 1941. (Naval History and Heritage Command)

The RN's top-ranking officer at the start of the war was Admiral of the Fleet **Sir Dudley Pound**. After a long career that included commanding a battleship at the Battle of Jutland, he achieved flag rank in 1926 and was given command of the Mediterranean Fleet in March 1936. In June 1939, he was appointed First Sea Lord, becoming the RN's senior officer. Pound was a man of considerable operational experience with a high capacity for work. He was known for his patience and loyalty to his superiors – both tested in his relationship with Churchill. As First Sea Lord, Pound not only saw his duty as issuing orders to the fleet, but also to supervise fleet operations at the expense of the commander on the scene, should conditions warrant.

As First Sea Lord, Pound oversaw all RN operations, but his primary concern was protecting the critical shipping lanes across the Atlantic. He realized that protection of trade was a vital prerequisite for victory over Germany. At the start of the war, he ordered the institution of convoys. This common-sense measure was undermined by the shortage of escorts and the short range of those that were available. It was not until July 1941 that a full

convoy system with transatlantic escort coverage was achieved. Even when shipping losses were high, he let his operational commanders handle the day-to-day management of the campaign.

Admiral Percy Noble held the critical appointment of Commander-in-Chief, Western Approaches for two crucial years, during which he created the conditions for eventual Allied victory in the Atlantic campaign. He was subsequently posted to the US as Head of the RN Admiralty Delegation, as shown in this view. (Britannia Royal Navy College, now in the public domain)

At the beginning of the war, **Admiral Sir Martin Dunbar-Nasmith** was the Commander-in-Chief, Plymouth. His command was responsible for protection of all shipping entering British waters by the South-West or North-West Approaches. By August 1940, use of the South-West Approaches was judged to be untenable with the Germans holding the nearby French coast. As a result, all shipping was diverted to the North-West Approaches. With this, Plymouth, on the south-west coast of England, was no longer suitable as the headquarters of the forces assigned to trade protection. As advocated by the Admiralty, Liverpool was selected as the site for a new headquarters (HQ), which was to be situated in Derby House. In the heart of the HQ was the Operations Room (also called the Plot), which tracked the battle on a massive wall chart of the Atlantic with every convoy, ship and known submarine

position depicted. Next to the Plot were two rooms. One was occupied by the Duty Naval Commander and Royal Air Force (RAF) Controller, and the second was set aside for the Naval Commander-in-Chief and the Air Officer Commanding 15 Group, Coastal Command. Work on this complex was not finished until February 1941.

In February 1941, **Admiral Sir Percy Noble** was appointed Commander-in-Chief, Western Approaches. He had joined the Navy in 1894 and brought a wealth of experience to his new assignment. From his new HQ at Derby House, he controlled the RN's battle against the U-boats until being relieved in November 1942 by Admiral Sir Max Horton. Noble was regarded by those who worked with him as a man able to build consensus for his preferred action. His relief was by design and should not hide the fact that his tenure was considered a success. He instituted measures that provided the building blocks for eventual victory in the Atlantic campaign. Among these were reinforcing and expanding the escort groups and improving their training.

Commander (later Captain) Donald Macintyre was given command of one of the RN's first permanent escort groups. In his first action, he was responsible for sinking two U-boats while killing one and capturing another top U-boat ace. By the end of the war, his groups accounted for six U-boats, but more importantly he brought all but a handful of the merchant ships under his protection safely to port. (Stratford Archive)

Commander (later Captain) Frederic ‘Johnnie’ Walker was the RN’s most successful U-boat killer, being credited with 20 U-boats destroyed. His defence of Convoy HG 76 in December 1941 was the start of his brilliant career during the Atlantic campaign. (Stratford Archive)

In 1941, the RN formed permanent escort groups. These were led by experienced commanders, some of whom went on to build formidable reputations as U-boat killers. The most prominent early escort group commanders were **Donald Macintyre** (commander of the 5th Escort Group), **Addison Joe Baker-Cresswell** (commander of the 3rd Escort Group), and **Frederic John Walker** (commander of the 36th Escort Group).

GERMAN

The commander-in-chief of the *Wehrmacht* (the German Armed Forces), including the *Kriegsmarine* (German Navy), was **Adolf Hitler**. After coming to power in 1933, he began efforts to increase the size of the navy in order to pursue his expansionist aims in Europe and beyond. He formally broke the restrictions of the Versailles Treaty which greatly restricted the size and composition of the navy with the 1935 Anglo-German Naval Agreement. Working with the Commander-in-Chief of the navy, he supported plans for a much larger force capable of conducting large-scale warfare against the RN, although lacking the strength to challenge it directly. Based on Hitler’s

assumption that Germany would not be in conflict with Britain until 1944 at the earliest, plans for naval expansion were not given top priority in Germany's rearmament, so the Kriegsmarine was not ready for war when it came in 1939.

With regard to U-boat operations, Hitler did not meddle to the same degree as he did with ground operations. It is clear that he understood little of naval operations other than taking an interest in the technical characteristics of large ships. However, he knew enough to understand that the most effective method of striking Britain's vulnerable trade routes was by U-boat attack. In spite of this, he was late in making U-boat production a top priority. There were always other competing requirements that were given higher priority – the campaign in France, preparations for the invasion of Britain, and then the invasion of Russia in June 1941. To be fair, the German war economy simply lacked the resources to support many competing requirements adequately, as much as Hitler declared his desire to increase U-boat production. Essentially, during the period of the U-boat campaign covered in this volume, the size of the U-boat force was too small to achieve decisive results.

Hitler and Erich Raeder worked together to increase the size of the German Navy. Both are shown here on 3 October 1936 at the launch of battleship *Scharnhorst* at Wilhelmshaven. Despite their efforts, the German Navy was almost completely unprepared for war when it broke out in September 1939. Both failed to prioritize U-boat construction before and after the start of the war. (Naval History and Heritage Command)

Although Hitler never dictated the tactical deployment of U-boats, he did influence the Battle for the Atlantic and the U-boat war by directing the navy to support a number of strategic priorities. These changed over time and drew resources away from the war against British shipping. Examples of this are the Norwegian campaign and the war in the Mediterranean in support of Italy, both of which drew U-boats away from the Atlantic shipping war.

Commander of the *Reichsmarine* (as the navy was called during the Weimar Republic) from 1928 was **Erich Raeder**. He joined the *Kaiserliche Marine* (Imperial Navy) in 1894 and through his work ethic and high intelligence was quickly promoted. By the start of World War I, he was the Chief of Staff of the Scouting Force and saw extensive action including at the Battle of Jutland in 1916. Raeder survived the demise of the Imperial Navy and his support for the failed 1920 Kapp Putsch against the Weimar Republic, and on 1 October 1928, was appointed as Chief of the Naval Command of the Reichsmarine. When it became the Kriegsmarine on 1 June 1935, Raeder retained his status as Commander-in-Chief. On 1 April 1939, he was promoted to grand admiral.

Raeder felt betrayed by Hitler when war broke out prematurely in 1939. He was pessimistic about the navy's prospects in a war against Britain and its allies. Faced with developing a strategy to complement Hitler's continental strategy, Raeder failed. He was steeped in the Imperial Navy's focus on the battleship and the battle fleet to win a decisive battle against the RN. In the competing schools of thought in the navy between a fleet centred on the battleship capable of winning a decisive battle against the British and a fleet focused on cruisers and submarines to fight a commerce war, Raeder selected the balanced (battleship) fleet approach. The final result of this preference was the Z Plan of 1939 in which battleships were highlighted.

Raeder's strategy to attack British shipping was ill founded. It failed to consider technology (primarily in the form of radar) and advances in aircraft. The cruiser war of World War I was not possible in World War II. To his credit, when war broke out, Raeder immediately revised the navy's building programme. Only ships that could be finished soon were scheduled for completion. The focus immediately shifted to building more U-boats and making improvisations to field forces. This was a short-term approach that impeded the development of technology, such as advanced U-boats and radar, which would provide long–term benefits. At the start of the war, Raeder pressed Hitler to lift all restrictions on U-boat and surface operations against

British shipping. He aggressively used his small surface fleet and a number of improvised surface raiders converted from merchant ships to attack Britain's lifelines. After the sinking of *Bismarck* in May 1941, Raeder's strategy of using large surface ships as commerce raiders was abandoned and the U-boat was revealed to be the only viable means with which to continue the campaign against British shipping.

The driving force behind the formation and growth of the U-boat force was Karl Dönitz. When Raeder was removed from his post in 1943, Dönitz assumed command of the German Navy and was promoted to *Grossadmiral*, as seen here. Even after this promotion, he refused to delegate control of the U-boat war in the Atlantic. He was worshipped by most of his men, even as he drove them into an increasingly futile struggle. (Naval History and Heritage Command)

Without a doubt, the single most important command figure in the Atlantic U-boat campaign was **Karl Dönitz**. From the first day of the campaign until the last, he either directed or oversaw German U-boat operations. Dönitz had joined the Imperial Navy in 1910 and was commissioned in 1913. He began World War I aboard the light cruiser *Breslau* in the Mediterranean. In late 1916, his request for a transfer to the U-boat arm was approved. By July 1918, he was the captain of *UB-68* assigned to the Mediterranean. Dönitz enjoyed a short career aboard U-boats – on 4 October, his boat was forced to

surface while trying to attack a convoy. Dönitz had to scuttle *UB-68* and he and most of his crew were captured by the British. In 1920, he was allowed to return to Germany. During his time as a prisoner of war, Dönitz stated that he came up with a new tactic that he called *Rudeltaktik* (literally 'pack tactic', more commonly known as wolfpack).

Dönitz was selected to remain in the navy after Germany's defeat in World War I. When the Kriegsmarine was legally allowed to possess submarines in 1935, Dönitz was appointed commanding officer of the first U-boat flotilla and was promoted to captain. He oversaw the growth of the embryonic U-boat force, though this expansion was far smaller and slower than he believed necessary.

On 1 October 1939, Dönitz was promoted to rear admiral and assumed the title of *Führer der U-Boote* (Commander, U-boats) directly under the control of the Naval War Staff. As previously mentioned, he had a different vision of what was required to defeat Britain from his superior, Grand Admiral Raeder. In Dönitz's mind, the U-boat war was a 'tonnage war' in which victory would be achieved by the sinking of enemy ships wherever that could be done with the most efficiency and the fewest U-boat losses. Raeder advocated a different approach. His 'commerce war' was concerned with attacking shipping where it had the greatest potential for 'decisive impact'. Examples of this included disrupting supplies heading for the Mediterranean or Russia. Nevertheless, Dönitz was given a very high degree of operational freedom to run the U-boat fleet as he saw fit. His command style required that he be in constant communication with his deployed U-boats. This need for frequent communication proved to be a critical vulnerability after the British broke German communication codes.

In terms of tonnage, Otto Kretschmer was the most successful U-boat commander with 47 ships sunk accounting for over 274,000 GRT. He was the master of the night surface attack, a tactic used for most of his victories. (Stratford Archive)

To his men in the U-boat force, Dönitz was an inspirational figure. First, as a former U-boat officer, he was respected as an experienced and hands-on leader. When U-boats returned to base in Lorient in Brittany, Dönitz debriefed their captains personally, serving to establish a firm link with his men. He made every effort to provide returning crews with generous leave and other comforts before their next patrol. In turn, his men appreciated their leader's obvious concern for their welfare. Dönitz was a man of undoubted intelligence and was a clear and independent thinker, and when required, he could be ruthless. Dönitz was a committed German nationalist and was equally loyal to Hitler and the ideas of National Socialism.

One of the most successful U-boat commanders in the first phases of the Atlantic campaign was Joachim Schepke. During his 14 patrols, he accounted for 37 ships of almost 156,000 GRT. This is Schepke in the conning tower of *U-100*. (Stratford Archive)

For most of the U-boat war, Dönitz commanded the U-boat force from his headquarters at Kernevel Point, located less than a nautical mile south of the submarine berths (and later concrete pens) at Lorient. It was a spartan HQ with a very small staff. Most important among the staff was the operations officer **Eberhard Godt**, who at the start of the war was only a lieutenant commander. He was responsible for running U-boat operations on a daily basis. In July 1940, he was promoted to commander, and to captain in September 1942.

During the first phase of the campaign, several U-boat commanders sunk a huge number of Allied merchant ships, earning them the title of ‘ace’. This phenomenon was noteworthy because the achievements of the submarine aces accounted for a large percentage of overall U-boat success. As with many things in Nazi Germany, a cult of personality grew up around the aces

and they achieved great fame. Among the most prominent during this period were **Otto Kretschmer** (*U-99*), **Wolfgang Lüth** (mainly as skipper of *U-43*), **Heinrich Liebe** (*U-43*), **Günther Prien** (*U-47*) and **Joachim Schepke** (*U-99*). An indication of the difference that these highly trained and highly motivated men made is highlighted by the fact that top-scoring ace Kretschmer sank 47 ships of over 274,000 GRT and damaged five more.

OPPOSING FORCES

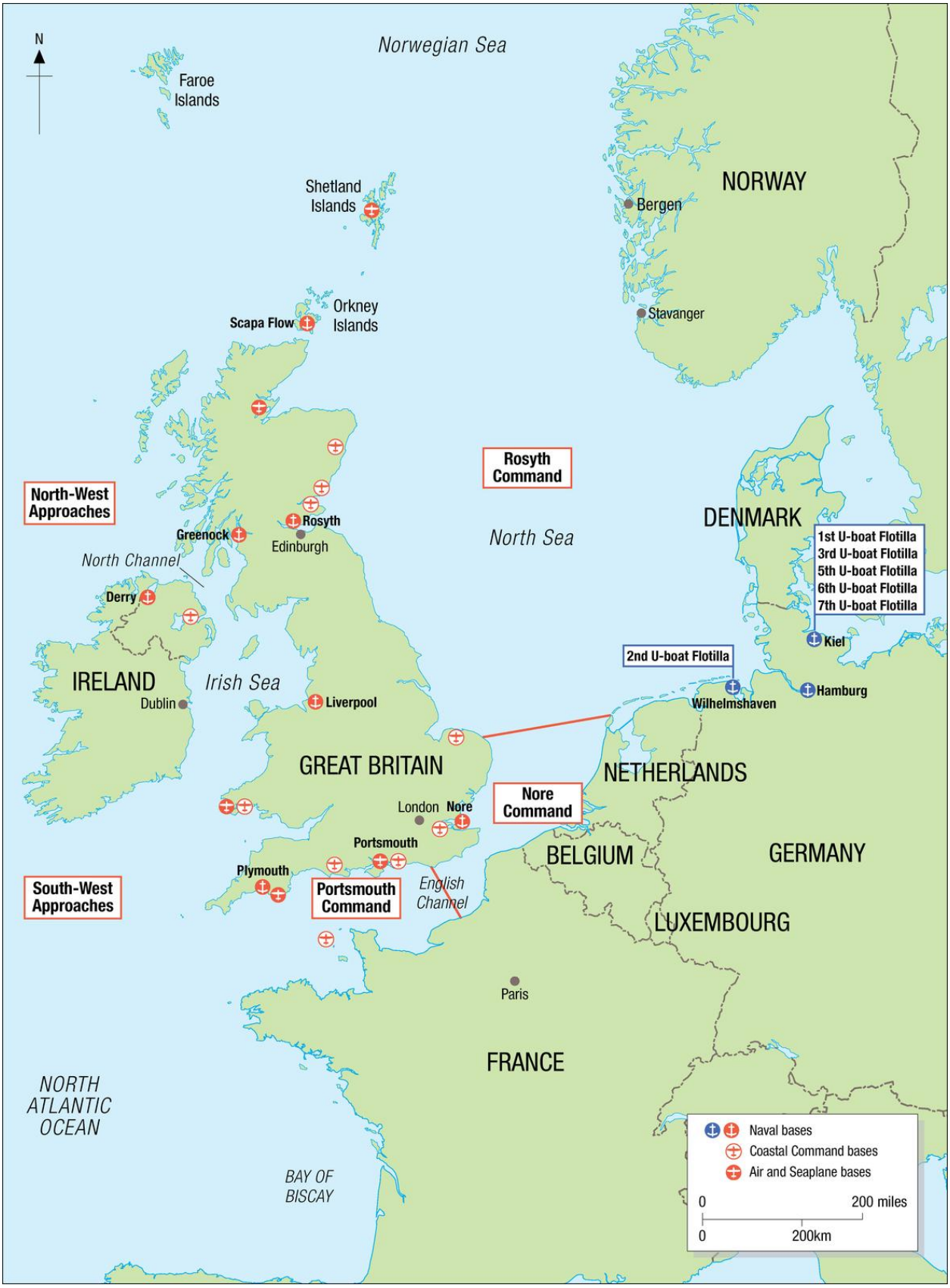
BRITISH

Naval forces

At the beginning of World War II, the Royal Navy was the largest navy in the world. However, its imposing order of battle was deceiving. The RN was stretched thin, as it had to protect British shipping around the world as well as contending with the Kriegsmarine, and possibly dealing with the Italian and Japanese navies. The RN was built to take on its enemies in fleet actions. Accordingly, of the RN's 100 operational destroyers at the start of the war, 33 were assigned to the Home Fleet and 29 to the Mediterranean Fleet; only one was assigned to the Western Approaches Command (WAC). Although 26 of the 101 operational smaller escorts were assigned to the WAC, the number of anti-submarine warfare (ASW) assets available to escort convoys was grossly inadequate.

The effectiveness of those ASW escorts assigned to the WAC was reduced by the capabilities, training and deployment of those assets. The WAC was composed of a disparate collection of ships – elderly destroyers, sloops, trawlers and corvettes. The lack of numbers and the short range of these small ships meant it was impossible to escort a convoy during its entire transatlantic passage. Instead, meeting points were established at the western edge of the Western Approaches covering the parts of the Atlantic thought to be in range of the U-boats. Incoming convoys from North America were escorted from these points to their destination in the British Isles, and outbound convoys only received protection for the first part of their passage.

HMS *Bulldog* was a B-class destroyer commissioned in 1931. By 1941, *Bulldog* had assumed duties in the North Atlantic as part of an escort group operating from Iceland. On 9 May, its boarding party recovered an Enigma coding machine and various codebooks from the captured *U-110*. To ensure German ignorance of the capture, *Bulldog*'s commander did not radio the news to his superiors but immediately sailed for Iceland, where he isolated the German prisoners to ensure the still valid codes could be exploited. This is *Bulldog* in 1945. (Stratford Archive)


N
Norwegian Sea
Faroe Islands
Shetland Islands
NORWAY
Bergen
Stavanger
Orkney Islands
Scapa Flow
Rosyth Command
North-West Approaches
Rosyth
Greenock
Edinburgh
North Sea
DENMARK
North Channel
Derry
1st U-boat Flotilla
3rd U-boat Flotilla
5th U-boat Flotilla
6th U-boat Flotilla
7th U-boat Flotilla
Kiel
2nd U-boat Flotilla
IRELAND
Irish Sea
Dublin
Liverpool
Wilhelmshaven
Hamburg
GREAT BRITAIN
NETHERLANDS
Nore Command
London
Nore
Portsmouth
BELGIUM
GERMANY
Plymouth
South-West Approaches
Portsmouth Command
English Channel
LUXEMBOURG
Paris
FRANCE
NORTH ATLANTIC OCEAN
BAY OF BISCAY
Naval bases
Coastal Command bases
Air and Seaplane bases
0
200 miles
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200km

At the start of the war, the few escorts available were assigned to convoys on an ad hoc basis. There were no established groups – escorts were assigned convoys as they were available and arrived as single ships or in small groups. Because command of the escorts fell to the senior officer present, the officer in charge could change several times during a convoy's transit as escorts came and left the convoy. There was no established doctrine for conducting escort operations; each officer in charge of the escort had his own tactical preferences that had to be shared with all the other escorts in the convoy by flashing lights (radio use was prohibited since this might disclose the convoy's location). Thus, every convoy escort was playing a pick-up game, working with other escorts perhaps for the first time with no standardized tactics or training. This high degree of unfamiliarity produced an uncoordinated defence when tested by the Germans.

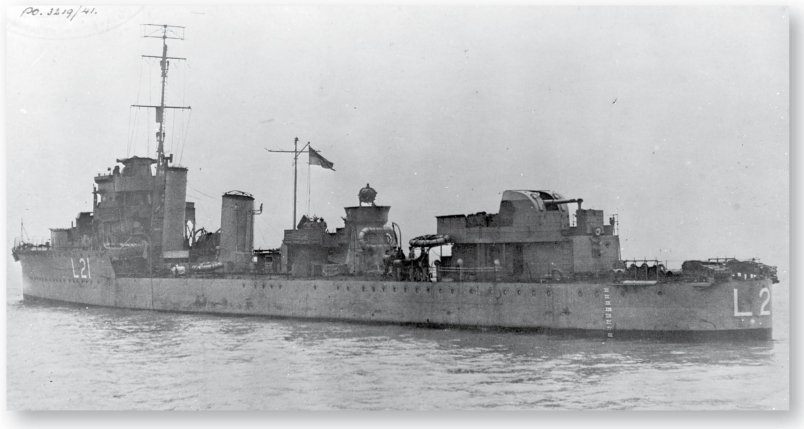
In May 1941, the British took measures to improve convoy defences by forming eight escort groups. Each had between four and eight escorts assigned on a permanent basis under the command of a single officer. This stabilization afforded the group the opportunity to develop a standard set of tactics and to train together in their use, thus greatly increasing the level of escort coordination. Also at this time, the Newfoundland Escort Force (NEF) was established with a strength of 30 destroyers, nine sloops, and 24 corvettes. This critical development enabled continuous escort of transatlantic convoys. In late 1941, the NEF was organized into eight escort groups.

By June 1941, the number of escorts in service had increased dramatically. Some 700 escorts of all types were in service, including 248 destroyers and escort destroyers, 48 sloops and cutters, 99 corvettes and 300 trawlers. By 1 October 1941, a total of 19 escort groups had been established. There was no uniform organization with each being assigned between 6 and 11 ships, representing a mix of destroyers, sloops and corvettes, including some which were in overhaul. Of the 19 groups, nine were based at Londonderry, seven at Liverpool and the last three at Greenock.

Several characteristics were desirable for a convoy escort. The most important was the ability to operate over long distances and in the often unforgiving waters of the North Atlantic. High speed, like that possessed by destroyers, was not essential, given the U-boat's mediocre surface speed and very limited underwater speed. Also, sonar could not be used effectively over

20kts, so the destroyer's greater speed offered little practical advantage in submarine hunting. Heavy gun armament was also not required, but it had to be sufficient to engage a surfaced U-boat. A heavy anti-aircraft armament was also not needed since air attack was not expected in the North Atlantic. What was essential was a large depth charge capacity.

Destroyers were in high demand for fleet operations and for convoy escort duties in high threat areas outside the Atlantic. Modern fleet destroyers were not assigned to convoy escort, leaving older destroyers for the WAC. Among these were ships dating from World War I. The RN adapted old V and W classes, dating from 1917 to 1924, for escort work. Many had several of their boilers removed in favour of more bunker space to increase range. Eventually, they all received some sort of radar and additional depth charge capacity.



Dating from 1918, W-class destroyer HMS *Viceroy* was converted early in the war and served as a convoy escort. Its conversion into an anti-aircraft escort with four 4in guns was not completed until January 1941. This view is *Viceroy* in April 1942 when it was active escorting convoys along Britain's east coast. (Naval History and Heritage Command)

By mid-1940, the RN was facing a destroyer crisis. Twenty-four had already been lost, and after the Dunkirk evacuation another 20 were damaged and forced out of service for repairs. Another 40 were held near Britain's south-east coast on anti-invasion duties. With the requirements for fleet work and considering those in overhaul, this left very few for convoy escort. It was at this moment that the United States made 50 old destroyers available for transfer to the RN. These possessed similar capabilities to the V and W classes. Also, beginning in 1940, the RN brought a large number of escort

destroyers into service. Unfortunately, the Hunt class was too short ranged for ocean work and thus most were employed along the east coast of Britain and in the Mediterranean.

During World War I, the RN had introduced a new class of ships designed for escort duty called sloops. They were ideal convoy escort ships and were superior as ASW ships compared to a destroyer. Sloops were easy to build, a critical factor for ASW, for which a large number of escorts was essential. They needed to possess adequate speed, not be fitted with low-angle guns and torpedoes (like destroyers), which were useless for convoy escort, and be good sea boats. Some sloops remained from World War I, and more were built between the wars, but in general the RN's inter-war shipbuilding programme failed to prioritize their construction. The first class to be mass-produced was the Black Swan class, which entered service in January 1940. This 1,750-ton full-load ship could steam at 18.5kts, had a range of 5,500nm and was heavily armed. Only 42 were completed, but in service they proved to be the best U-boat hunters operated by the RN.

HMS *Wolverine* was typical of the older destroyers that were assigned convoy escort duty when the war began. It began its career as a fleet destroyer in 1920. In 1939, it was reactivated from reserve and assigned convoy duty along Britain's east coast. By 1940, it was escorting Atlantic convoys. This view shows *Wolverine* after conversion to a short-range escort. The forward 4.7in gun has been replaced with a Hedgehog rocket launcher, a Type 271 radar was added on the bridge and the anti-aircraft fit replaced with two 20mm Oerlikon cannons. (Naval History and Heritage Command)

A member of the 12-ship Black Swan class was HMS *Erne*, commissioned in April 1941. Eight of these served in the RN and became the most effective U-boat killers of any escort. (Stratford Archive)

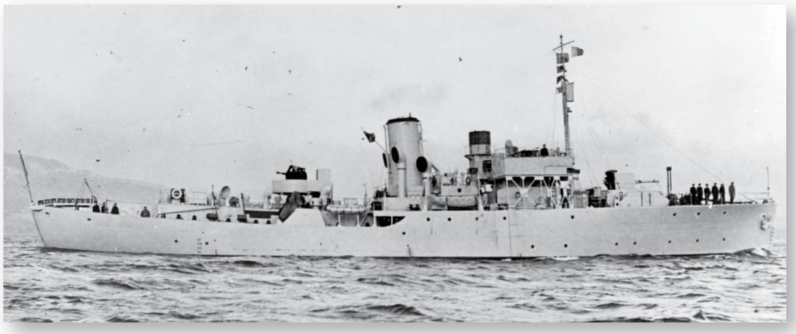
The real workhorses of the Atlantic campaign were the corvettes of the RN, and later the Royal Canadian Navy (RCN). The backbone of the corvette fleet was the Flower class. Designed for mass production and built to mercantile standards, 300 were projected. Beginning in 1940, the first 145 of these 1,195-ton full-load ships left British shipyards, joined eventually by 124 from Canadian yards. In order to meet the Admiralty's required number of escort ships, construction was simplified to the greatest degree possible. The final result was a ship capable of making 16kts with a range of 5,000nm at 10kts. The original armament consisted of one 4in gun, a handful of machine guns and a large number of depth charges deployed by launchers and racks on the stern.

A large number of Flower-class corvettes entered service in 1940. They carried the burden of the U-boat war until 1943. Although the Flowers filled an immediate need, they were not an ideal open ocean escort. Among their shortcomings were a lack of length (which affected seakeeping), speed and endurance. The improved River-class corvette was in production, but these were not operational until well into 1942.

All RN anti-submarine escorts carried ASDIC (named after the Allied Submarine Detection Investigating Committee), now better known as sonar. Using soundwaves, sonar could detect U-boats under water. Developed late in World War I, the British believed it was a potentially decisive weapon in any future U-boat war, since it took away their cloak of invisibility. This was an extremely unrealistic assessment, since in practice the range of sonar is subject to a number of operational and environmental conditions. Under

actual conditions, the range of the sonars on RN escorts was limited to about 1,000–1,500yds.

This painting of a Flower-class corvette depicts HMS *Hydrangea*. Commissioned in January 1941, it was quickly thrown into action in March after using February for anti-submarine training. The Flower class was based on a whaler design, making it suitable for mass production. Originally intended as a coastal escort, it was forced into open-ocean duties. In heavy seas, living conditions were horrific, as hinted at in this scene. (Naval History and Heritage Command)



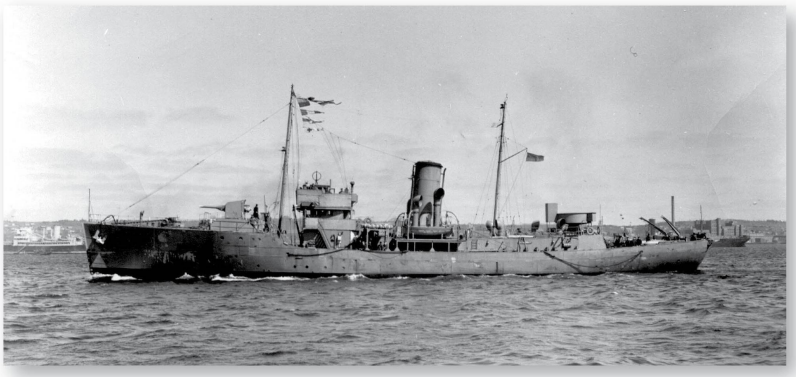
Another Flower-class unit was HMS *Chrysanthemum*, renamed *Commandant Drogou*. This beam view of the ship shows its primary features. The main gun was a 4in single mount forward. Early ships had the mainmast placed forward of the superstructure. This ship has already received some modification with the Type 271 radar abaft the bridge and a 2-pdr anti-aircraft mount abaft the stack. On the stern are depth charge racks; the original depth charge capacity of 25 was increased to 50 in August 1940. (Naval History and Heritage Command)

Another reason that sonar was not the decisive instrument the RN had expected it to be was that the U-boats' preferred tactic of attacking at night on the surface made sonar useless. Given this preferred tactic, it was vitally important that the RN develop radar small enough to fit on escort ships. In

1940, the primitive Type 286 radar began to be deployed aboard escorts. However, it was unreliable, possessed a short range and could not be trained. In May 1941, the improved Type 271 went to sea on trials. This was the first centimetric naval radar, which gave it much better definition. For the first time, escorts could reliably detect surfaced U-boats and under certain sea conditions, could even detect the periscopes of submerged U-boats.

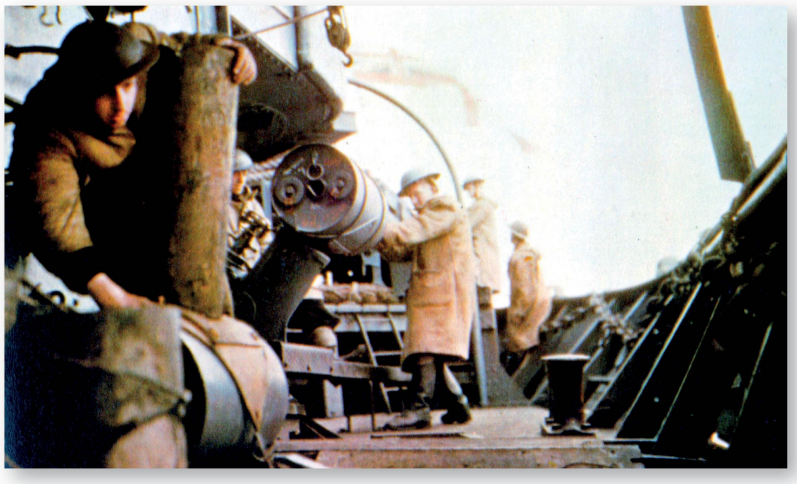
RAF Coastal Command

One of the enduring lessons of World War I was the effectiveness of aircraft in combating the U-boat threat. Just the presence of aircraft forced U-boats to submerge to avoid attack, thus greatly reducing their effectiveness. Despite this legacy, the RAF gave a very low priority to ASW aircraft in the inter-war years. In 1939, most of the aircraft of Coastal Command (responsible for trade protection) were obsolete. Just over 240 aircraft were available in 19 squadrons. The most numerous aircraft was the Avro Anson, making up half of Coastal Command's strength. It possessed a totally inadequate range of 510nm, a top speed of 144kts and a pathetic payload of just 360lb. On an emergency basis, Lockheed Hudsons were ordered from the US, but only one squadron had been re-equipped when the war broke out. The Hudson was a dramatic improvement on the Anson, since it possessed twice the range and five times the bomb load. The only modern long-range aircraft was the Short Sunderland flying boat, but only two squadrons were available when war began. To make up for the shortage of long-range patrol craft, the British ordered the Consolidated PBY Catalina from the US.



Ordered in 1940 and built in Montreal, HMCS *Chambly* was one of the first Canadian corvettes ready for Atlantic service. It was a remarkable achievement for the Canadians to build 79 original design Flower-class units from a very small industrial base. This is a view of

the ship as completed with minesweeping gear and no weapon yet fitted to the aft bandstand. (Canadian Naval Heritage)



Depth charges were the only means available early in the war to attack submerged U-boats. The standard RN depth charge of the period was the Mark VII with 290lb of explosives. The lethal radius of a depth charge depends on the depth of the detonation and the type of submarine that is being targeted. Against a German Type VII boat, the lethal radius was approximately 10–13ft, making accuracy essential. This was difficult to do against a target moving in three dimensions. (Stratford Archive)

In addition to the lack of aircraft, those available were equipped with weapons of very limited effectiveness. The standard ASW weapons were 100lb and 250lb anti-submarine bombs and an air droppable 450lb depth charge. Unfortunately, the bombs were more deadly to the aircraft dropping them than to U-boats. In 1939, half a dozen aircraft were brought down by their bombs bouncing off the water and exploding. The Anson could not even carry the larger bomb. Only the Sunderland could carry the depth charge at the start of the war. On top of this, the bombsight on both types failed to perform effectively.

It was not until November 1941 that Coastal Command transformed itself into a force capable of attacking U-boats from the air. This had been accomplished by the development of a new 250lb depth charge, deploying radar on aircraft, and implementing new tactics to attack U-boats when they were detected.

Introduced into RAF service in 1936, the Avro Anson was Coastal Command's mainstay aircraft at the start of the war. In this role, it was totally inadequate. The British had already made this assessment and had placed orders for 200 Lockheed Hudson aircraft before the war. This image, taken in 2015, is of the only flyable Anson. (L-Bit, **CC BY-SA 3.0 https://creativecommons.org/licenses/by-sa/3.0**, via Wikimedia Commons)

Intelligence

A huge factor in the Atlantic campaign was the intelligence war fought between the British and the Germans for information on each other's deployments and intentions. Intelligence was collected in many ways, but in a theatre as vast as the Atlantic, the most significant method was through 'radio intelligence', known today as 'signals intelligence'. Three methods were used to gain radio intelligence. The easiest was traffic analysis that examined the volume, precedence and recipients of radio messages. By using this method, it is possible to discern levels and timing of enemy activity. The second method was finding the direction of the ship or unit sending a radio message. If two or more bearings were gained, the general location of the transmitter could be ascertained. To do this, the RN established direction-finding stations (called 'Y' stations) at three locations in Britain, two in the Mediterranean, and others in Gibraltar, Bermuda, Sierra Leone, Kenya and later in northern Russia. This network covered the Atlantic with varying degrees of accuracy (the closer the transmitter is to the collecting station, the more accurate the line of bearing). By using direction finding, the location of every deployed U-boat could potentially be plotted, since during this phase of the war U-boats were required to report their positions and status at least daily and more if they were in contact with the enemy. Fixes from direction-finding stations were not sufficient for tactical purposes, but this problem was addressed when escorts were equipped with direction-finding capabilities.

Ordered as a replacement for the obsolescent Anson, the Lockheed Hudson began to be delivered to Coastal Command units in May 1939. The Mark I featured a range of 1,960nm and a bomb load of 1,400lb, far in advance of the Anson. The USN also used the Hudson, as seen in this view. (Naval History and Heritage Command)

Decoding the content of radio messages was potentially the most lucrative method of gathering radio intelligence. The breaking of German naval codes transmitted with the Enigma coding machine has become legendary, but in the early phases of the war this was not a major factor for the British. To decode German naval messages, the British had to acquire an Enigma machine and code material. Leading what became an enormous effort to decipher the Enigma codes was the Government Code and Cypher School at Bletchley Park. By various means, Bletchley Park acquired the material it needed; a big break came on 9 May 1941 when the Enigma machine on *U-110* was seized along with the codes. Combined with the seizure of code material on a small weather ship two days earlier, the British were able to develop a capacity to read Enigma messages on a consistent and timely basis.

The speed by which Enigma codes were broken and rendered into 'Ultra' intelligence was critical and varied throughout the war. Only beginning in February 1941 was Ultra information gained, and this was intermittent. Decoding took at least 48 hours, meaning its usefulness was limited. In June, this was reduced to as little as 24 hours. From the last part of May 1941, the British were able to read the bulk of traffic transmitted in the primary

German naval code. From this point until the end of the war, the British knew about nearly all the U-boat locations and operations. For the remainder of 1941, this translated into the seemingly uncanny ability of the RN to route convoys out of danger from U-boat packs deployed to detect and attack them. There is no doubt that radio intelligence, and Ultra in particular, played a critical role in deciding the Atlantic campaign.

GERMAN

Naval forces

By 1934, Raeder and Hitler had agreed to expand the German Navy, even in the face of British opposition. In June 1935, the Anglo-German Naval Agreement allowed the Germans to build up to 35 per cent of the RN and to allow for the construction of U-boats. Hitler was not content with a clearly inferior navy, so supported Raeder's plans for a much larger fleet capable of waging war against the RN. The resulting Z Plan of 1939 recognized that it was not possible to build a battle fleet capable of directly challenging the RN. What Raeder did envision was a fleet built for cruiser warfare against British worldwide sea lanes, supported by a traditional battle fleet smaller than the RN's but comprising superior ships on an individual basis. Despite their success in World War I, U-boats were not a focus of the programme. Even so, it was planned to build 249 U-boats by 1948, of which 133 would be completed by 1942–43. In 1939, the plan was modified and before the start of the war in September, 131 U-boats were ordered.

However, the grandiose Z Plan did not give the Germans a fleet ready for war on 1 September 1939. Few ships ordered were ready at this time because of a shortage of shipyard capacity, skilled workers and necessary materials, especially steel. On the first day of war, the Kriegsmarine was made up of two modern battleships, three *Panzerschiffe* ('armoured ships', called 'pocket battleships' by the British that were essentially heavy cruisers), one heavy and six light cruisers, 21 destroyers, 12 torpedo boats and 57 submarines. Against this small fleet was arrayed the might of the RN and the French Navy.

After all the planning for a future war with Britain, the German Navy was caught unprepared for war when it did come at the beginning of September 1939. The total U-boat force included 57 units. Ironically, even after the

success of their submarines in World War I, the German Navy possessed the fewest number of submarines of any of the five major naval powers in September 1939. Even the total of 57 was deceptive; of these, 32 were too small for operations in the Atlantic. In addition, 79 U-boats were under construction or had been ordered. Within 18 months, German shipyards were to deliver nine boats per month – three small Type II boats, four medium-size Type VIIC units and two large Type IX boats.

Both existing force levels and the planned construction programme were clearly inadequate for achieving significant results. In the first week of the war, Dönitz issued a memorandum stating that 300 U-boats were needed for operations in the North Atlantic to force the British to their knees. Of these, one-quarter needed to be Type IX boats with the rest being the standard Type VII. In addition, Dönitz stated a need for 48 large boats capable of operations in distant waters. Raeder accepted this requirement and in a meeting with Hitler on 23 September explained that the existing construction programme was inadequate and that a monthly production rate of 20–30 boats was necessary. Although Hitler seemed convinced of the necessity of ramping up U-boat production, his first priority was re-equipping the army after the Polish campaign. In the competition for tight resources, the navy was a loser. A final decision on allocation of raw materials was put off until May or June 1940. As a result, Dönitz did not have a firm understanding of the size of his force available for future operations.

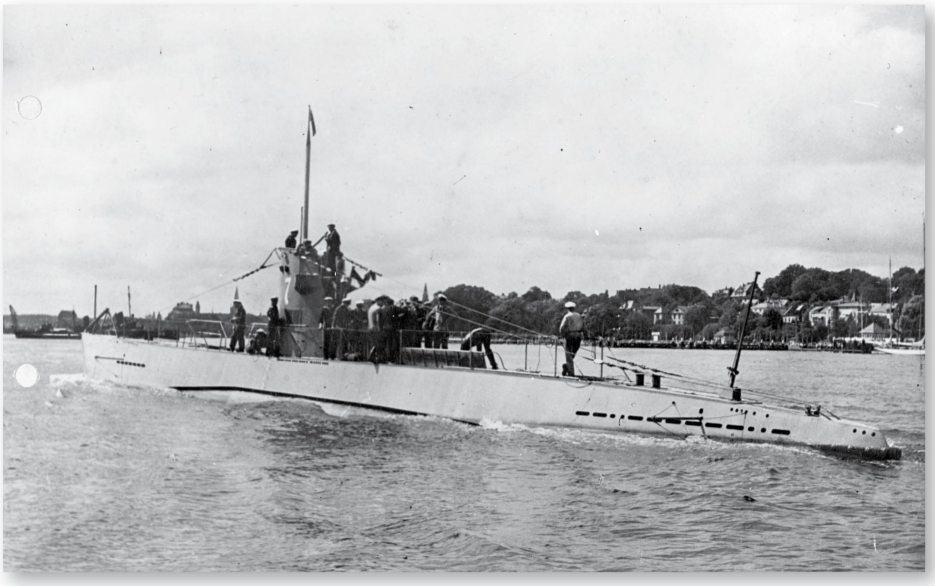
The U-boats

The U-boats available to Dönitz at the start of the war were little changed from those used by the Imperial Navy in World War I. It is important to remember that to call German U-boats of World War II submarines is misleading. In fact, they were designed to spend the great majority of their time on the surface, only submerging to escape attacks or to launch them.

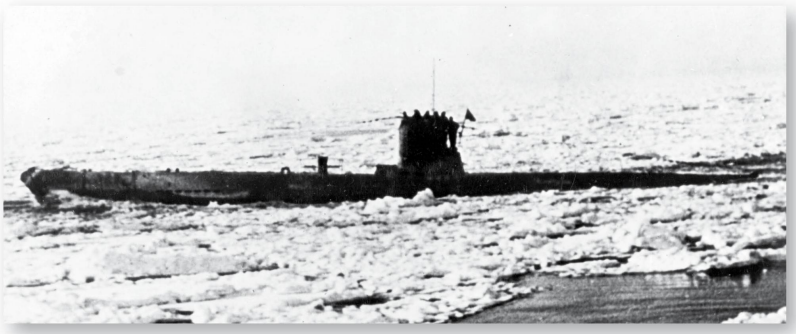
The first oceangoing submarine built by the Germans after World War I was the Type IA U-boat. Based on the German-designed, Spanish-built submarine for Turkey, the design was satisfactory, but only two were built (*U-25* and *U-26*), as Dönitz chose to focus on the smaller Type VII and larger Type IV boats. The Type I design served as the basis for more successful boats to follow, most notably the Type IX.

Nazi Germany's first mass-produced U-boat was the Type II. Fifty of these boats were produced in four variants with the first being completed in 1934.

Because of their small size (only 250 tons on the surface for the Type IIA), limited range (1,600nm for the Type IIA, but increasing to 5,650nm for the Type IID) and small weapons load (only five torpedoes), they possessed little combat capability. In practice, they were restricted to operations in the North Sea, but when the Germans acquired bases in Norway, the Type II boats extended their reach to the North-West Approaches. The real value of these small boats was as training units for Dönitz's growing U-boat fleet.



This pre-war photograph shows Type IIB U-boat *U-7*. Though slightly wider and longer than the original Type IIA design, these boats possessed minimal open ocean combat capabilities because of their lack of range and load of only five torpedoes. *U-7* served almost exclusively as a training boat in the Baltic except for two patrols during which it sank two small freighters. (Naval History and Heritage Command)

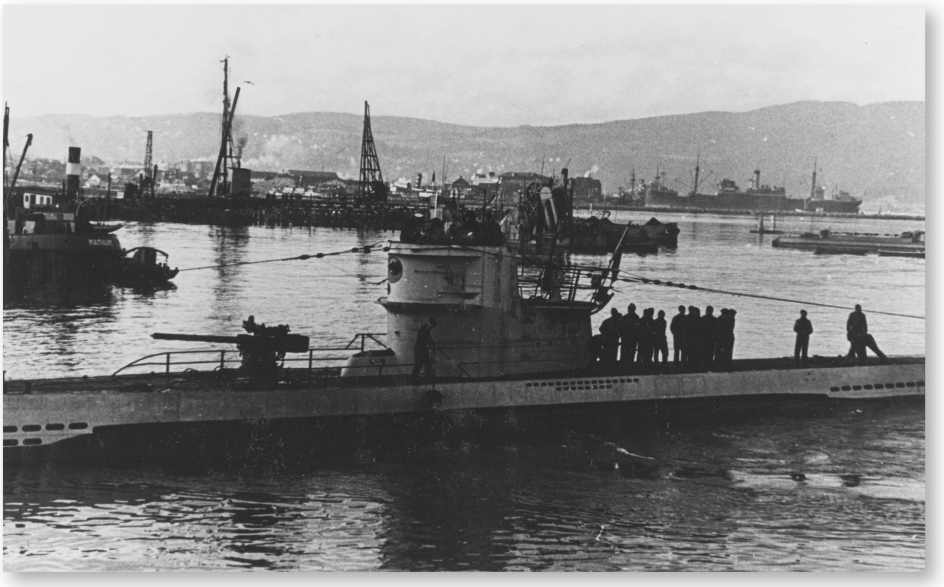


A Type IIB-class submarine, probably during the winter of 1940/41 in the Baltic Sea. Called 'dugout canoes' by German submariners due to their small size and surface instability, Type II

boats were useful mainly for training. The Type II C and D boats possessed the range for operations around Britain and were used in combat roles throughout 1941 before being retired to training duties. (Naval History and Heritage Command)

The bedrock of the U-boat fleet was the Type VII boat. This was based on a World War I Type UB III design and then modified after the war in spite of the Treaty of Versailles, which forbade Germany from submarine design work. Ten Type VIIA boats were built between 1935 and 1937. The modified Type VIIB improved the boat's range, speed and weapons load. In total, 24 were built between 1936 and 1940.

By far the most important German submarine of the war was the Type VIIC. With 568 units built between 1940 and the end of the war, it was easily the most produced submarine in history. Although well liked by its crews, and epitomizing the features that Dönitz thought were important, it was actually a mediocre design. In fact, the design was nearly obsolescent at the start of the war and it fell further behind as the war progressed. Dönitz wanted a small boat that was easy to produce and that carried a large torpedo load. It had to be quick to dive to avoid attack and manoeuvrable. At 769 tons surfaced and 871 tons submerged, the Type VIIC was big enough to carry fuel for a range of 8,500nm at 10kts. The two diesel engines could drive the boat at a top speed of 17.7kts on the surface. On battery power, the boat could only make 80nm at 4kts. Its top submerged speed was 7.6kts, but this severely reduced its underwater range. The boat could safely dive to a depth of 400ft, although emergency dives to over 750ft were recorded.



The most produced submarine in history was the Type VIIC with 568 built between 1940 and 1945. This is a Type VIIC entering Trondheim, Norway. Although an effective fighting machine in capable hands when first introduced, the growing obsolescence of this design became more apparent as the war progressed. (Naval History and Heritage Command)

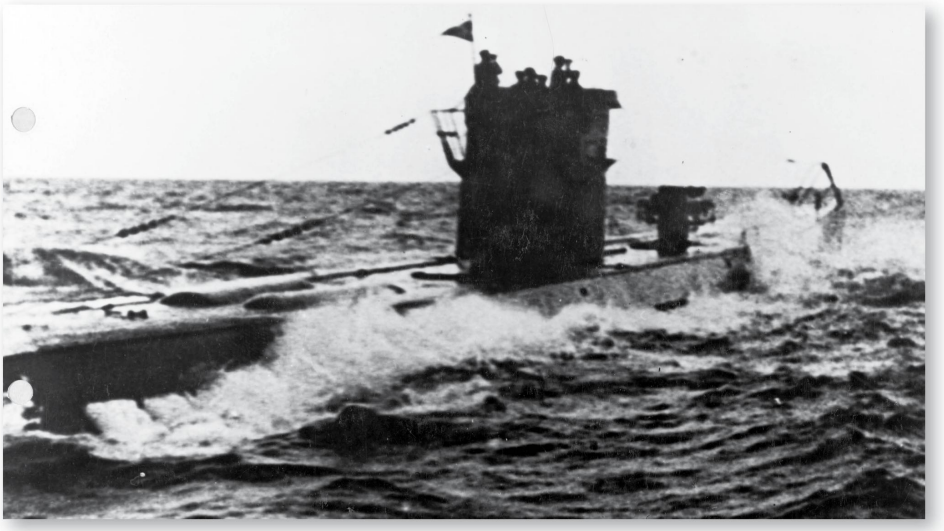
With the use of four bow tubes and an exterior stern tube, 14 21in torpedoes could be embarked. A single 88mm deck gun was fitted in front of the island and 220 rounds carried. Six Type VII U-boats (Type VIID) were modified into minelayers with a capability to carry up to 15 mines in vertical tubes and up to another 39 in the torpedo tubes.

Complementing the medium-range Type VIIC was the longer-range Type IX. Built from 1937, 194 were completed by the end of the war. Four variants were designed, with the first Type IXA being commissioned in 1938. Displacing 1,032 tons on the surface, it possessed enough fuel for a range of 10,500nm at 10kts. Top speed was 18.2kts on the surface. Once submerged, speed was limited to 7.7kts for a distance of 65–78nm.

The larger Type IXA carried six torpedo tubes (four on the bow and two on the stern) and could carry 22 torpedoes. The size of the deck gun was increased to 105mm. Only eight boats of this class were completed.

In 1938, the first of the improved Type IXB boats entered service. The main difference from the earlier Type IX variant was an increased range to 12,000nm. Fourteen of these boats were built with construction ending in March 1940. The Type IXB class was the most successful U-boat class of the war with each boat averaging over 100,000 GRT of Allied shipping sunk.

During 1941, the first of the 54 Type IXC boats were commissioned into service. With the capability to carry an additional 43 tons of fuel, range was further increased to 13,450nm. The Type IXD boats were simply enlarged Type IXC boats modified for cargo transport; they had no torpedo tubes, and a reduced battery capacity.



Beginning in 1938, the Germans began to commission Type IX boats. Eventually, 194 of five variants were completed. Much larger than the preceding Type VII, they possessed greater range that enabled them to operate in the South Atlantic and off the east coast of the United States. Operating in these poorly defended areas allowed them to stack up amazing scores. (Naval History and Heritage Command)

A Type IX boat departing base with the crew in formation on deck. Although less manoeuvrable and slower diving than the Type VII, the 14 Type IXB boats were the most successful of any type of U-boat and averaged over 100,000 GRT sunk. Three of the top six U-boat commanders in terms of shipping sunk made their mark on Type IX boats. (Naval History and Heritage Command)

Of note, U-boats during this period of the war did not carry radar. They only received radar in late 1942. Nor did they carry radar detection devices to provide warning of approaching British radar-equipped ships and aircraft. Other than the bridge crew equipped with binoculars, the only sensor was an active and passive sonar.

The main German U-boats were not outstanding weapons. Salient weaknesses of the Type VII were its limited range and relatively small weapons loadout. These restricted where it could effectively operate. The larger Type IX boat was able to operate much farther from bases in France and carried enough weapons for a prolonged patrol. This gave Dönitz the capability of operating U-boats in areas where British defences were much weaker.

U-boat tactics

The mainstay Type VII boat was little more than a torpedo boat with the capability of temporarily submerging to escape danger. It possessed a fairly

high surface speed, which it used to reach its assigned patrol area and then to react to reports from other boats of new targets. However, its submerged speed of only 8kts (and this for only a short period) meant that it was all but impossible to manoeuvre to a favourable torpedo firing position in daylight while under water. Dönitz trained his crews to act as torpedo boats by gaining contact on a target during the day and then maintaining contact at extreme range. Once it was dark, the U-boat closed the target on the surface relying on the stealth provided by its low silhouette. If light conditions were unfavourable, the boat would use its higher surface speed to move into a position ahead of the target and then conduct a submerged attack. If sufficient darkness was available, the boat would conduct its attack on the surface.

Dönitz gave much thought to new tactics for attacking convoys. As evinced in World War I, a single boat attacking a concentration of merchant ships and escorts could not deliver decisive results. The answer was to mass a number of U-boats to attack a convoy to overwhelm its defences and inflict serious losses on the merchants. These group tactics had been experimented with in 1918 but had proved unsuccessful. Dönitz refined them with the assistance of better radio communications. In its initial form and as first executed in October 1939 by a group of six U-boats, the concept of several U-boats operating under a single officer to conduct a coordinated attack on a convoy proved impractical. The failure of the first wolfpack and of two others the following month made Dönitz modify his approach. U-boats patrolled separately in the expected area of convoy activity. Once a U-boat spotted a convoy, it would shadow it and radio reports of its location to Dönitz's headquarters. Using this contact information, other nearby boats would be ordered to converge on the convoy, forming a wolfpack. Each U-boat captain was free to attack whenever favourable tactical conditions existed. Once the maximum number of boats had gathered around the convoy, a general attack was ordered from U-boat command. Other than to mass as many U-boats as possible on a single convoy, no effort was made to mount a truly coordinated attack.

Using this tactic, the Germans gained several important successes in late 1940 and 1941. However, these tactics possessed several vulnerabilities. Foremost was the need for a high volume of radio communications from the deployed boats to headquarters and from Dönitz's command staff to the boats. The Germans thought that this was not an issue, since they assessed their communications were secure. At the tactical level, the frequent use of

radios was a potential weakness, since the position of the boats could be determined by high-frequency direction finders (HF-DF). Eventually, the Allies deployed HF-DF on escorts, which provided them with an immediate line of bearing on a nearby U-boat, which could be used for an attack. Pack tactics were usually successful in overwhelming inadequate or poorly trained escorts. Once the Allies increased the number of escorts and improved their proficiency, U-boats faced increasing losses. Further, U-boats transited on the surface to mass against a detected convoy. Once Allied aircraft were introduced in sufficient numbers to make surface transits untenable, the U-boats lost their ability to manoeuvre and mass freely.

The long-range Fw 200C Condor was used by the Luftwaffe to threaten ships in the Western Approaches. It carried 2,200lb of bombs, but with its crude bombsight was forced to attack at very low altitude, thus exposing the vulnerable aircraft to defensive fire. Using this method, Condors accounted for 20 ships in 1940 and another 58 ships sunk in 1941. (© Imperial War Museum, HU 39426)

German air forces

Throughout the war, the U-boats found it difficult to locate convoys. This weakness could have been alleviated by the employment of German Air Force (*Luftwaffe*) long-range aircraft to provide reconnaissance support. However, coordinated operations between the U-boats and the Luftwaffe proved to be an illusion. The head of the Luftwaffe, *Reichsmarshall* Hermann Göring, consistently refused to allow his aircraft to come under the operational control of the navy. At issue was control of the only group, I/Kampfgeschwader 40 (I/KG 40), to fly the Fw 200 Condor long-range bomber/reconnaissance aircraft. Only these aircraft, which had been flying

from an airfield just west of Bordeaux since August 1940, possessed the range to fulfil Dönitz's scouting requirements.

After presenting his case to the Wehrmacht operations staff, Dönitz obtained a Führer Order on 7 January 1941 to place I/KG 40 under his operational control. However, the low availability of these aircraft (an average of two per day) and the weak navigational skills of their crews paid fewer dividends than expected. By March, Göring had largely undermined the January order. He was determined to prevent the development of an independent naval air arm. The Luftwaffe preferred to concentrate on attacking shipping rather than the unglamorous job of flying reconnaissance missions for the U-boats. This approach was not entirely fruitless – between June 1940 and March 1941, the Fw 200s sank 52 ships of 207,889 GRT. However, to make more effective use of the limited numbers of Fw 200s, in mid-1941, the crews were instructed to avoid all combat, and the Condors were used solely to report Allied shipping movements.

The Condors were of great concern to the British, who took several measures to counter them. Sporadic bombing of their bases was ineffective. Air cover was needed, and the most effective method was to get fighters on ships. This led to the development of catapult aircraft merchantman (CAM) and later escort carriers.

Intelligence

British intelligence efforts have been rightfully renowned for their efforts during the Atlantic campaign. However, often forgotten are the efforts of German naval intelligence, which in the first phase of the campaign outshined their British counterparts. The most successful arm of German naval intelligence was its cryptanalysis unit known as the *B-Dienst* (short for *Beobachtungsdienst*: 'Observation Service'). During the first part of the war, it was based in Berlin and by late 1942 employed 1,100 personnel. This number was insufficient to attack the many British naval codes then in use, so lack of resources restricted German success in this key area. In mid-October 1939, B-Dienst achieved its first success against the RN's Naval Cypher which was used for operational messages. The Germans maintained some degree of access into this system until 1941. The RN's Naval Code was used for administrative messages including communications to merchant shipping. With some gaps, this system was being read by B-Dienst from the start of the war until December 1943. Such access provided the Germans with an

awareness of convoy movements. Introduced in October 1941, Combined Naval Cipher No. 3 was used by both the RN and USN for communications with transatlantic convoys. By February 1942, it too was penetrated by B-Dienst. German codebreakers provided Dönitz with a huge advantage in the vital task of detecting convoys, especially during the periods when only a small number of boats were operating in the Atlantic.

ORDERS OF BATTLE

ALLIED

Royal Navy, 1 September 1939

(only those commands directed at trade protection are shown)
Portsmouth Command (Admiral Sir William James)
12th and 16th Destroyer Flotillas (16 destroyers)
5 anti-submarine trawlers
4 minesweepers
4 minesweeping trawlers
Nore Command (Admiral Sir H. Brownrigg)
19th Destroyer Flotilla (9 destroyers)
5 escorts
3 minesweepers (Dover)
3 minesweepers, 9 minesweeping trawlers (Thames Estuary)
Rosyth Command (Vice Admiral C.G. Ramsey)
15th Destroyer Flotilla (8 destroyers)
8 escorts
Western Approaches Command (Admiral Sir M. Dunbar-Nasmith, VC)
3rd, 11th, 12th and 17th Destroyer Flotillas (32 destroyers)
6 escorts
3 anti-submarine trawlers
3 minesweeping trawlers

Royal Canadian Navy

7 destroyers
5 minesweepers

GERMAN

German U-boat force, 3 September 1939

1st U-boat Flotilla (Kiel)
8 Type IIB, 2 Type IIC
2nd U-boat Flotilla (Wilhelmshaven)
5 Type VIIA
3rd U-boat Flotilla (Kiel)
7 Type IIB
5th U-boat Flotilla (Kiel)
2 Type 1A, 5 Type VIIA
6th U-boat Flotilla (Kiel)
5 Type IX
7th U-boat Flotilla (Kiel)
7 Type VIIB
Training Duties
6 Type IIA, 3 Type IIB, 4 Type IIC, 3 Type IX

OPPOSING PLANS

BRITISH

In January 1939, the Admiralty issued war plans in the event of a European war. It was assumed that hostilities would commence against Germany and Italy, and that Japan would enter the war at a later phase. The first priority was defence of the home islands, including defence of the shipping lanes, which would be crucial for sustaining the British war effort. The RN was spread thin as it had to guard home waters, control the Mediterranean and protect thousands of nautical miles of trade routes around the globe. Defence of trade was an enormous responsibility. In 1939, British shipping totalled 21 million GRT with 2,500 ships at sea at any time. Britain's total merchant fleet was composed of 3,000 oceangoing cargo ships and tankers and another 1,000 smaller ships devoted to coastal trade.

Defence of Britain's home waters was the responsibility of several commands. The most important was the Home Fleet, which was tasked to engage the German fleet whenever possible and to institute a blockade against German shipping by controlling the North Sea. Four shore commands, Portsmouth, the Nore (Chatham), Rosyth and the Western Approaches, were charged with defending shipping. The introduction of convoys was seen as an integral part of this defence. This did not include shipping in low-threat areas or in areas where British forces were inadequate to defend convoys. In areas beyond home waters, the Admiralty planned to only patrol chokepoints and rely on 'evasive routing' elsewhere.

Convoying merchant ships under naval escort was an age-old tactic. It took heavy shipping losses in 1917 to finally force the RN to adopt this measure. This view of an American merchant convoy nearing its destination in England during World War I gives the appearance of a typical convoy. Although a large formation, it is a small target in the expanses of the Atlantic. By putting ships into convoys, the rest of the ocean was swept clean of potential targets. Falsely seen as a defensive measure, convoys also force submarines to make attacks on the best-defended areas of the ocean. (Naval History and Heritage Command)

Because of their high speed and ability to carry large guns up to 6in, the RN converted 53 passenger liners into armed merchant cruisers beginning in 1939. Three more were converted by the RCN. For the initial period of the war, these ships provided the only escort for convoys until they reached the Western Approaches. Although somewhat useful against surface raiders, they possessed no real anti-submarine capabilities, so losses were heavy with 14 armed merchant cruisers being lost. This is HMS *Cilicia* in November 1942. It was heavily armed with eight 6in guns. (Naval History and Heritage Command)

Measures to thwart German U-boats included laying mines along the east coast of Britain and instituting convoys for all coastal shipping immediately, mining the Strait of Dover to close down the English Channel as a transit route to the Atlantic, and guarding the northern exits to the Atlantic with ships of the Northern Patrol.

The first convoys were established along the east coast of Britain between the Thames Estuary and the Firth of Forth. These began on 6 September; both south- and northbound trips were organized every second day. The first open-ocean convoy was established on 7 September. These departed from the Thames (named OA) and Liverpool (OB) and steamed through the Irish Sea and on to North America. In the first phase of the war, these convoys were only escorted to a point at 12.5 degrees west longitude, after which the convoy dispersed and the ships proceeded to their destinations independently. The escort lingered at the dispersal point and picked up the next convoy bound for Britain. Convoys headed to Britain from Canada were given only a weak escort to defend against raiders (usually in the form of a merchant cruiser) before picking up their ASW escort. Commencing in July, ships departing from Britain headed south were formed into OG convoys headed to Gibraltar.

Merchant ships carrying commodities to Britain from South America, the Indian Ocean and Africa were staged at the protected anchorage of Freetown, Sierra Leone, to be convoyed north to Britain. On 14 September, the first convoy (dubbed ‘SL’) departed Freetown and headed north to Britain. Ships as slow as 7.5kts could proceed in this convoy.

The most important convoys in the entire British scheme were those from Nova Scotia to Britain. The first of these, Convoy HX 1, departed Halifax on 16 September under the local escort of Canadian ships. Ships capable of 9–10kts were usually included in the HX convoys. On 19 September, the first fast convoy from Halifax (HXF 1) left for Britain. The last major inbound convoy route was from Gibraltar, dubbed ‘HG’. HG 1 left Gibraltar on 26 September.

It was impossible to get every ship already under way into a convoy by 3 September when war began. Those that were not in convoy and that were unescorted were the most vulnerable and took the great majority of losses at the hands of the U-boats. The importance of convoy operations was immediately apparent – by the end of 1939, 5,756 ships were organized into convoys and only four were lost to U-boat attack. The requirement to sail in

convoy extended only to British merchants. The British tried to persuade neutral shipping to also use convoy protection, but this was only partially successful until these countries were occupied by the Germans. Once this occurred, the British took control of these formerly neutral ships.

It is important to note that initially only ships capable of making more than 9kts and less than 15kts were placed into convoys. Slower ships were not convoyed, since they would have restricted the speed of the entire convoy. Faster ships were thought to be relatively immune to U-boat attack. Both slow and fast ships were routed independently in areas thought to be clear of German submarines. This approach worked well with fast ships, but slow ships continued to suffer heavily. From November 1940 to May 1941, ships sailing on the Halifax and Freetown routes averaged a loss rate of approximately 6 per cent on a round-trip voyage while in convoy, but if sailing independently averaged 14–15 per cent loss rates. Contributing to this was the decision in November 1940 to reduce the maximum speed for ships to be included in a convoy from 15 to 13kts. Seeing losses to independents so high, in May 1941, the speed requirement reverted to 15kts.

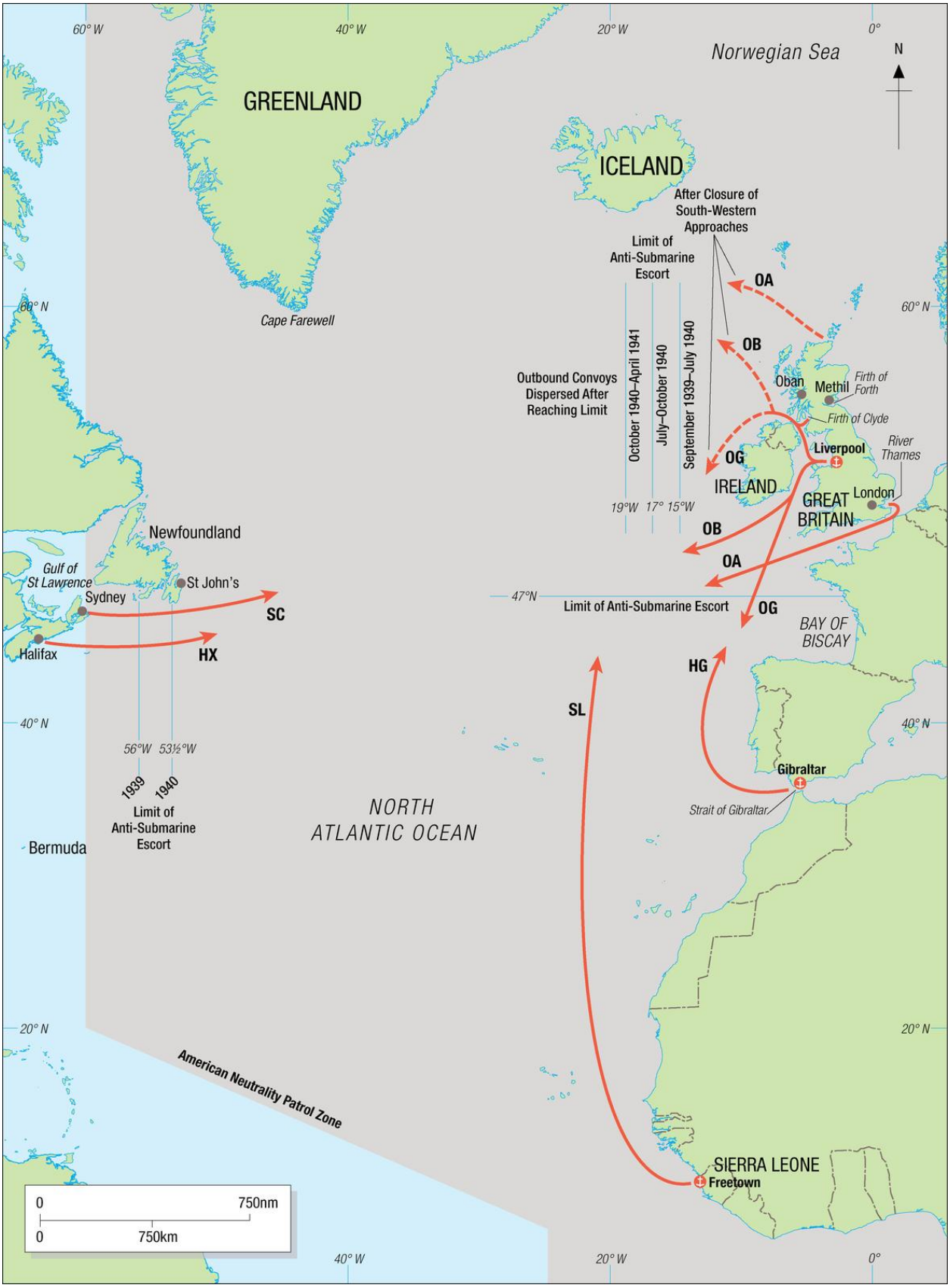
The scope of the convoy system gradually expanded. By May 1940, anti-submarine escort was only provided out to about 200nm west of Ireland. In July 1940, the limit of close escorts for convoys headed outbound was extended from 15 to 17 degrees west longitude; in October, it was extended again to 19 degrees. To relieve congestion in Halifax, a new convoy from Sydney, Nova Scotia, was instituted on 15 August 1940. The new convoy was named ‘SC’ and was intended for ships in the 7.5–8kt range. SC convoys were originally intended to run for the summer of 1940, but went well beyond that. Presenting a large and slow target, SC convoys figured prominently in the Atlantic campaign. For all eastbound convoys from Canada, the limit of close escort was extended to 53.5 degrees west longitude.

By 1941, the convoy system had evolved to the structure shown below.

Principal Convoy Routes to and from Britain in 1941

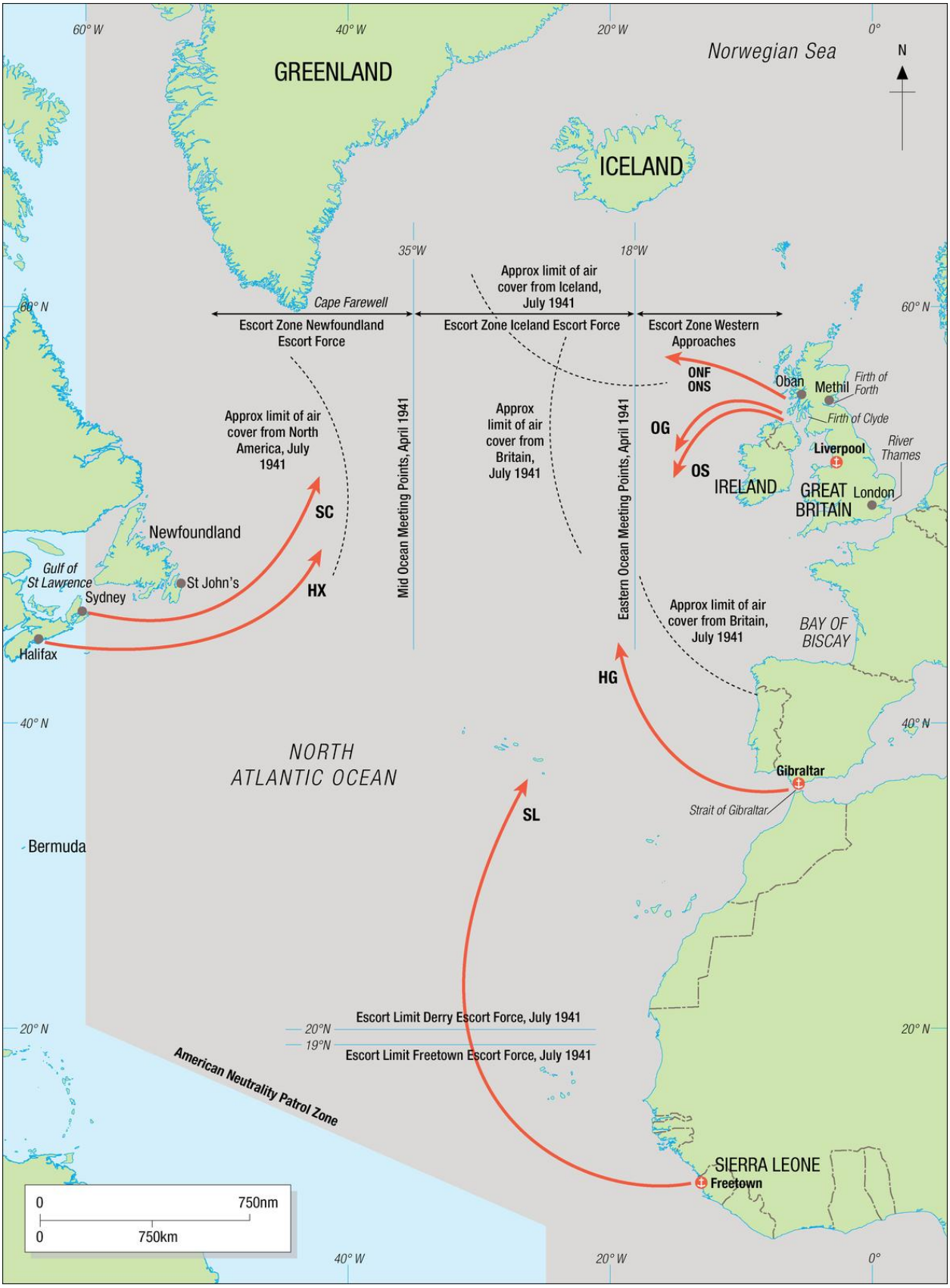
Convoy code	Route	When begun
Inbound		
SL	Sierra Leone to Britain	14 September 1939
HX	Halifax to Britain	16 September 1939
SC	Sydney to Britain	15 August 1940

HG	Gibraltar to Britain	26 September 1940
Outbound		
ONF	Britain to Halifax (fast ships)	27 July 1941 (replaced OB convoys from Liverpool)
ONS	Britain to Halifax (slow ships)	26 July 1941
OG	Britain to Gibraltar	1 October 1939
OS	Britain to Sierra Leone	24 July 1941


60° W
40° W
20° W
0°
Norwegian Sea
N
GREENLAND
ICELAND
Cape Farewell
After Closure of South-Western Approaches
Limit of Anti-Submarine Escort
OA
OB
OG
60° N
Outbound Convoys Dispersed After Reaching Limit
October 1940–April 1941
July–October 1940
September 1939–July 1940
Oban
Methil
Firth of Forth
Firth of Clyde
Liverpool
River Thames
IRELAND
GREAT BRITAIN
London
19°W 17° 15°W
Newfoundland
Gulf of St Lawrence
St John's
Sydney
Halifax
SC
HX
47°N
Limit of Anti-Submarine Escort
BAY OF BISCAY
HG
SL
40° N
56°W 53½°W
1939
1940
Limit of Anti-Submarine Escort
Gibraltar
Strait of Gibraltar
NORTH ATLANTIC OCEAN
Bermuda
20° N
American Neutrality Patrol Zone
SIERRA LEONE
Freetown
0
750nm
0
750km

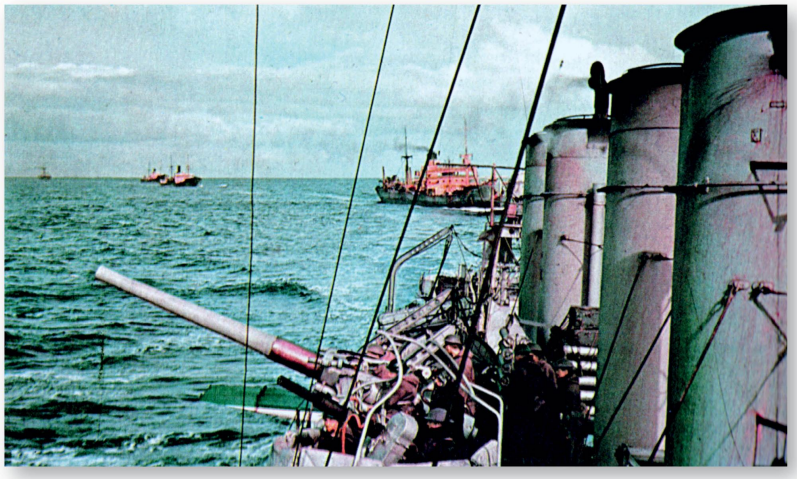
Early war convoy routes

The British adopted convoys almost immediately after the war began. Outbound convoys from Britain ran primarily from the Thames Estuary. After the fall of France, the South-West Approaches were abandoned, so convoys departed from ports in the west of the UK. Inbound convoys to Britain included fast and slow convoys from Canada, and convoys from Sierra Leone and Gibraltar. Initially, convoys were only provided with anti-submarine protection for a very limited part of their route. Inbound convoys received only minimal protection, usually in the form of an armed merchant cruiser, against surface raiders.


60° W
40° W
20° W
0°
Norwegian Sea
N
GREENLAND
ICELAND
35°W
18°W
60° N
Cape Farewell
Escort Zone Newfoundland Escort Force
Approx limit of air cover from Iceland, July 1941
Escort Zone Iceland Escort Force
Escort Zone Western Approaches
ONF
ONS
Oban
Methil
Firth of Forth
Firth of Clyde
OG
OS
Liverpool
River Thames
IRELAND
GREAT BRITAIN
London
Approx limit of air cover from North America, July 1941
Approx limit of air cover from Britain, July 1941
Mid Ocean Meeting Points, April 1941
Eastern Ocean Meeting Points, April 1941
SC
HX
Newfoundland
Gulf of St Lawrence
St John's
Sydney
Halifax
Approx limit of air cover from Britain, July 1941
BAY OF BISCAY
HG
40° N
NORTH ATLANTIC OCEAN
Gibraltar
Strait of Gibraltar
SL
Bermuda
20° N
Escort Limit Derry Escort Force, July 1941
20°N
19°N
Escort Limit Freetown Escort Force, July 1941
American Neutrality Patrol Zone
SIERRA LEONE
Freetown
0
750nm
0
750km

Convoy routes, June 1940–December 1941
As more escorts became available, continuous escort was provided to convoys inbound from North America beginning in May 1941 and from Freetown in July 1941. For convoys transiting the North Atlantic, three groups of escorts were required to provide continuous coverage. Although Coastal Command expanded its coverage, air protection of North Atlantic convoys was still limited. A large air gap remained; the Germans were poised to exploit this weakness in 1942.

As more escorts became available, the level of protection increased. A lack of escorts meant that convoys proceeded for most of their voyage with no or very minimal protection provided by auxiliary cruisers (passenger liners fitted with weapons). It was not until May 1941 that the first HX convoy was provided with an anti-submarine escort for its entire transatlantic trip. This important development followed the expansion in the overall escort force, and by the RCN in particular. Covering a single convoy across the Atlantic was a considerable effort. When a convoy departed Halifax, it was protected by an RCN escort group to a Western Ocean Meeting Point off Newfoundland. Here, another escort group relieved the first one and provided protection until reaching the Mid-Ocean Meeting Point (MOMP) off Iceland somewhere near 35 degrees west longitude. In April 1941, escorts began using bases in Iceland, which extended escort coverage to the west. The precise location of the MOMP was always different so that the Germans could not wait at a known point. At the Eastern Ocean Meeting Point (EOMP) at approximately 18 degrees west longitude, a third escort group took responsibility for the convoy.



A North Atlantic convoy proceeds in heavy seas peacefully under the watchful protection of an escort. Most transatlantic convoys never came under attack from U-boats. By late 1941, the U-boat threat in the North Atlantic was much reduced by the relatively small numbers of U-boats available and British skill in routing convoys around known U-boat concentrations. (Stratford Archive)

Between 8 and 12 July 1941, US Marines occupied Iceland, relieving the Canadian garrison on the island. US naval and air forces began to use bases on the island, further deepening the United States' involvement in the Atlantic campaign months before Pearl Harbor. In this view, USN destroyers are visible in Reykjavik Harbour during the initial occupation of Iceland in July 1941. An RN anti-submarine trawler is on the left. (Naval History and Heritage Command)

USS *Kearny*, an American Gleaves-class destroyer, was the first USN ship to be damaged by German naval forces in the Atlantic campaign. On 17 October, *U-568* hit the destroyer with a torpedo, killing 11 and wounding 22. The crew was successful at containing the flooding and

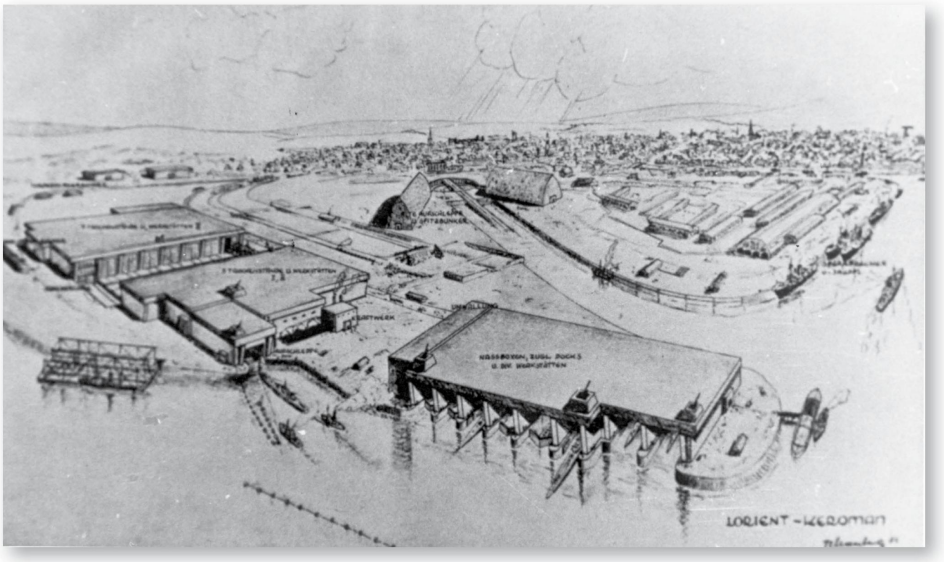
the ship survived. This view shows *Kearny* en route to Reykjavik, Iceland, at 10kts after being damaged. (Naval History and Heritage Command)

Throughout 1941, the United States took increasingly belligerent measures against German naval forces in the Atlantic. This occurred well before the Pearl Harbor attack in December, which formally brought the Americans into the war. The destroyers-for-bases deal and the American occupation of Iceland in July 1941 were both designed to support British efforts in the Atlantic. On 4 September, the USN was allowed to escort convoys comprising not only American-flag ships. Starting with HX 150, the USN provided escort for certain convoys up until the MOMP. After escorting convoys eastward, the American escorts refuelled in Iceland and then took Convoy ON to Canada. Later, the USN also agreed to escort convoys to about 22 degrees west longitude. Moving the rendezvous to the east meant that the WAC escort groups did not have to refuel in Iceland and could spend more time at sea. In turn, this freed three escort groups from the North Atlantic to strengthen the SL and HG convoys. Inevitably, this led to clashes between German and American naval units. On 4 September, American destroyer *Greer* was attacked by a U-boat while proceeding to Iceland. The destroyer responded with depth charges, but neither side incurred damage. However, on 17 October, destroyer *Kearny* was damaged by a torpedo, and on 31 October, destroyer *Reuben James* was sunk by a U-boat while escorting HX 156. The United States was an active belligerent in the Atlantic in all but name months before the Pearl Harbor attack.

GERMAN

Dönitz had plenty of time between the wars to devise a new operational concept for the next time German submarines went to war against British shipping. His new scheme was based on several assumptions. First, he assumed that the prize regulations that restricted wartime submarine operations would be discarded by Germany and all other signatories. This assumption was correct. Second, Dönitz also believed that the British faith in ASDIC was misplaced. He assessed that ASDIC did not negate the U-boat threat as the British believed, but that it was only effective in locating submarines in tactical situations. In order to attack convoys, the primary tool used by the Allies to defeat the U-boat in World War I, Dönitz planned to

mass submarines (the genesis of the wolfpack tactic) and attack convoys at night. Attacking on the surface, the submarines would be protected at night, since their small surface profile made them difficult to spot. This assumption was initially well founded, but the development of radar made its continuing viability dubious. As early as 1938, the Germans were developing devices capable of locating ships and submarines by radio waves. The British were also developing radar. Though not widely deployed at the start of the war, it would eventually remove a surfaced U-boat's nocturnal protection and invalidate one of Dönitz's key assumptions.

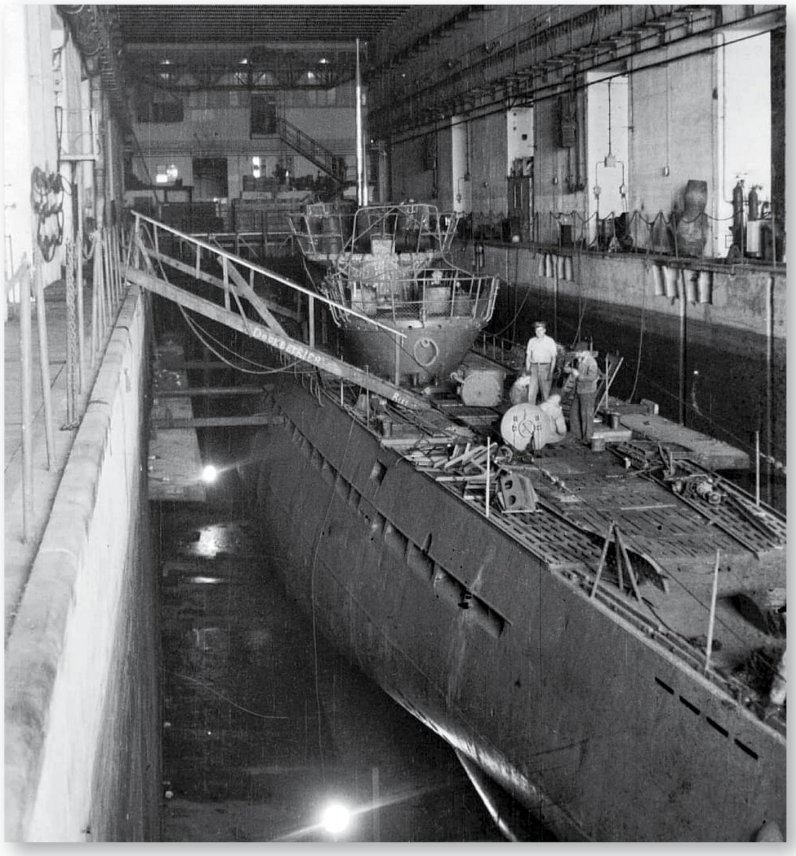


As part of his plan to move U-boats to operational bases in France as quickly as possible, Dönitz foresaw the need to build protective shelters for the boats where they could undergo maintenance undisturbed by possible bombing. In November 1940, work began on docks protected by concrete roofs (the two curved roof structures in the centre of the drawing). In February 1941, work began on the first of three enclosed pens at Lorient with bomb-proof, steel-reinforced, layered concrete roofs (the three structures in the foreground). Eventually, 30 boats could be enclosed under cover. Despite heavy bombing of Lorient, no U-boats were lost at their base. (Naval History and Heritage Command)

Third, based on a wargame conducted in early 1939, Dönitz believed he could achieve decisive results against British shipping with a force of 300 operational U-boats. In such a campaign, U-boats would play the primary role, since surface ships would have difficulty getting into the Atlantic and being supplied there. As in World War I, the English Channel would be closed to U-boats, so all transits would have to move through the North Sea,

the chokepoints out of which could be mined by the British. The best way to circumvent the British blockade of the initial U-boat bases was to secure bases in France. Dönitz was aware of the danger posed to U-boats by aircraft and foresaw a need for building protective shelters at submarine bases.

The basic viability of Dönitz's pre-war planning for a U-boat campaign against the British can be questioned for a number of important reasons. The initial number of submarines available was utterly inadequate for such a campaign. Production was not planned to reach Dönitz's desired 300 submarines until 1942. Any war would stretch German resources to the limit with the navy being allocated the fewest resources of any of the three services. In comparison, the British could call upon many more maritime resources, and after the entry of the United States, the resource advantage between the Allies and the Germans expanded exponentially. Another resource disadvantage for the Germans was fuel. German production of diesel and fuel oil was insufficient to meet the needs of the Wehrmacht, particularly the navy. This shortage affected fleet operations as early as 1941, although the U-boat arm was the least impacted. However, it did mean that support to the U-boats from the other parts of the navy was limited.



This photograph shows *U-510* safely inside a bunker at Lorient where it could undergo maintenance. The availability of these protected berths was essential for U-boat operations. In France, in addition to Lorient, the Germans built U-boat bases at Brest, St-Nazaire, La Rochelle and Bordeaux (also at Marseille in the Mediterranean. All of these featured bunkers. (Stratford Archive)

Dönitz dismissed, or at least downplayed, the impact of technology on the U-boat war. Sonar did prove effective once sufficient platforms were deployed to use it. Use of radar became widespread and forced Dönitz to alter the basic operating parameters of his U-boats. Surface attacks were rendered impossible. When forced to submerge, the submarines of the period were much less effective.

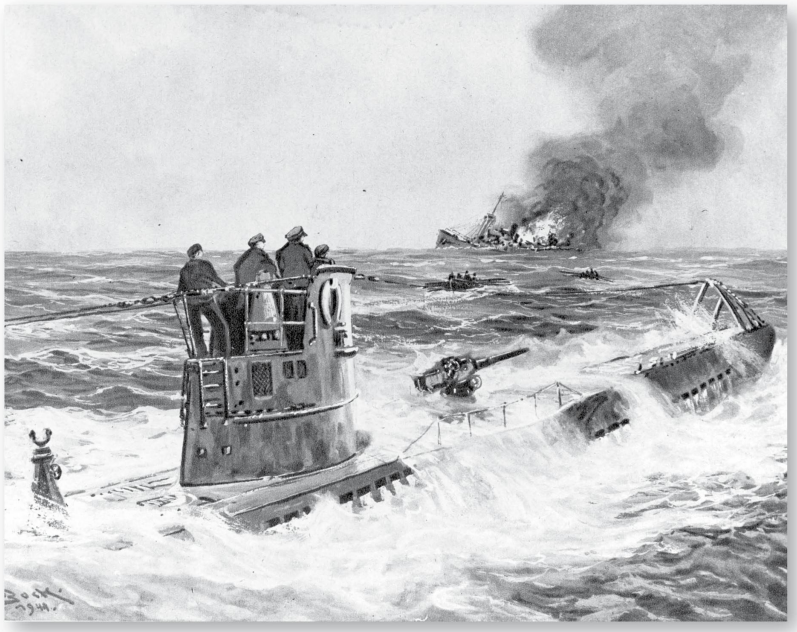
Against the growing tide of technology the Allies brought to bear against the U-boats, Dönitz was forced to conduct his campaign with submarines barely improved since World War I. Not until much later in the war did the Germans bring into service true submarines, and when this occurred, the war was almost over.

THE CAMPAIGN

THE FIRST SIX MONTHS

Up until the last minute, Raeder was content to accept Hitler's assurance that the Polish crisis would not result in war with the British or French. Accordingly, forces in the Baltic Sea were brought up to full readiness in preparation for a war with Poland. As a precautionary measure, Raeder agreed to move some forces into the Atlantic. On 19 August 1939, these forces, in the form of 14 U-boats and pocket battleships *Graf Spee* and *Deutschland*, were ordered to leave port. Two more U-boats departed on 22 and 23 August.

Raeder's first concern was to keep the RN out of the Heligoland Bight to defend key German ports and bases in the North Sea. German surface forces completed the deployment of the 'Westwall' mine barrage by 24 September. German submarines also began to lay mines off the east coast of Britain. The forces deployed into the Atlantic were restricted in their operations. The pocket battleships were withheld from attacking British shipping and the U-boats were ordered to conduct their attacks in accordance with prize regulations and not to attack any passenger ships or any French shipping. On 23 September, Raeder was able to convince Hitler to give the navy permission to attack French ships and for U-boats to attack merchant ships without warning. The prohibition on attacking passenger ships remained.



In this somewhat fanciful German painting from World War II, a German U-boat sinks an English freighter. Apparently, the attack was conducted with prize regulations in mind since the crew has been allowed to take to lifeboats. Having to remain on the surface for this process to play out, the vulnerability of the U-boat is obvious as in this scene. (Naval History and Heritage Command)

This is a pre-war view of passenger liner SS *Athenia*. On 3 September, it became the first ship lost to U-boats in the Atlantic campaign. Although under orders not to attack passenger liners, the captain of *U-30* attacked without warning. (Clifford M. Johnston/Library and Archives Canada/PA-056818)

As Hitler and Raeder negotiated the rules of engagement for U-boats, the first significant event of the Battle of the Atlantic occurred on 3 September

when *U-30* came across the British passenger liner *Athenia* in the Western Approaches. The skipper, Fritz-Julius Lemp, believing he had sighted weapons aboard the ship, assessed it to be an armed merchant cruiser and therefore fair game. Without warning, Lemp launched two torpedoes. One hit, causing fatal damage. When Lemp surfaced, it was obvious that he had attacked a passenger ship. In total, 118 passengers died, including 22 Americans. Lemp's attack was in direct violation of Hitler's orders to abide by prize regulations. Killing innocent women and children, and Americans, reminded the Germans of World War I U-boat attacks that prompted the United States to enter the war. Dönitz was forced to deny Lemp's involvement in the attack and went so far as to falsify *U-30*'s deck logs. With this first uncertain step, the Atlantic campaign was under way.

The sinking of *Athenia* led the RN to accelerate the introduction of the convoy system on 6 September. The British also began arming merchant ships. Gradually, the restrictions on U-boats were lifted. As of 17 September, U-boats were permitted to attack merchant ships (except passenger liners) in the waters around Britain and later in the month this was extended to ships in the same waters steaming without lights. It was not until May 1940 that all restrictions were lifted on attacks against shipping in the waters around the British Isles and in the Bay of Biscay.

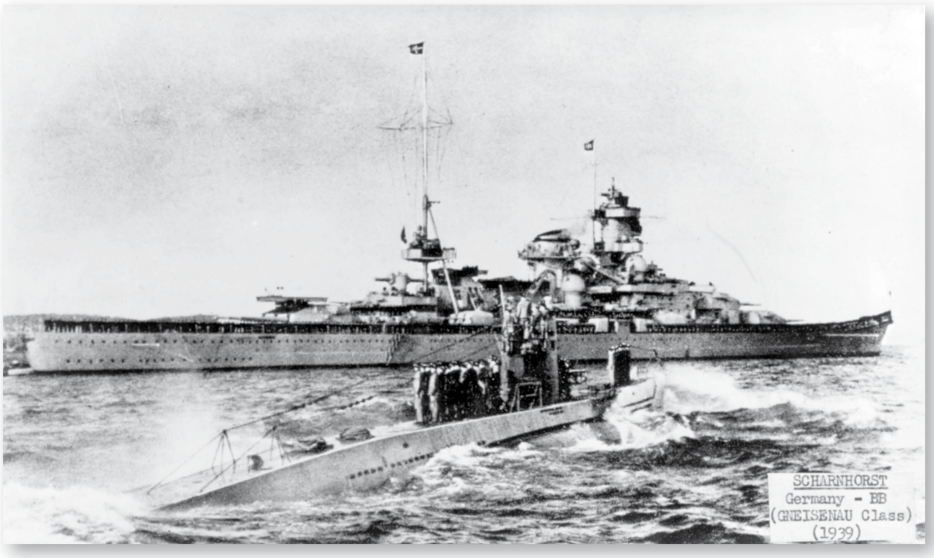
Dönitz deployed his full strength in the opening weeks of the war. By the first week of September, 21 U-boats were stationed in three groups west of the British Isles, west of the Bay of Biscay and west of the Iberian Peninsula. These boats sank 35 merchants and captured three more. Although the overall number of boats on patrol was not large, they enjoyed initial success, since the British did not have time to bring all shipping under naval control or to organize convoys. By 18 September, only 11 boats were still on patrol in the Atlantic.

Although the focus of German efforts was against shipping, U-boats struck important blows against the RN in the first couple of months. At the start of the war, the RN organized submarine hunter groups centred on fleet carriers. On 14 September, *U-39* spotted aircraft carrier *Ark Royal* west of Ireland on anti-submarine patrol. The U-boat fired a salvo of three torpedoes at the RN's most valuable warship, but they exploded prematurely, disclosing the submarine's presence. In return, *U-39* was quickly sunk by the carrier's escorts. Just three days later, *U-29* sighted carrier *Courageous*, also operating as part of a submarine hunter group west of Ireland. The submarine fired a

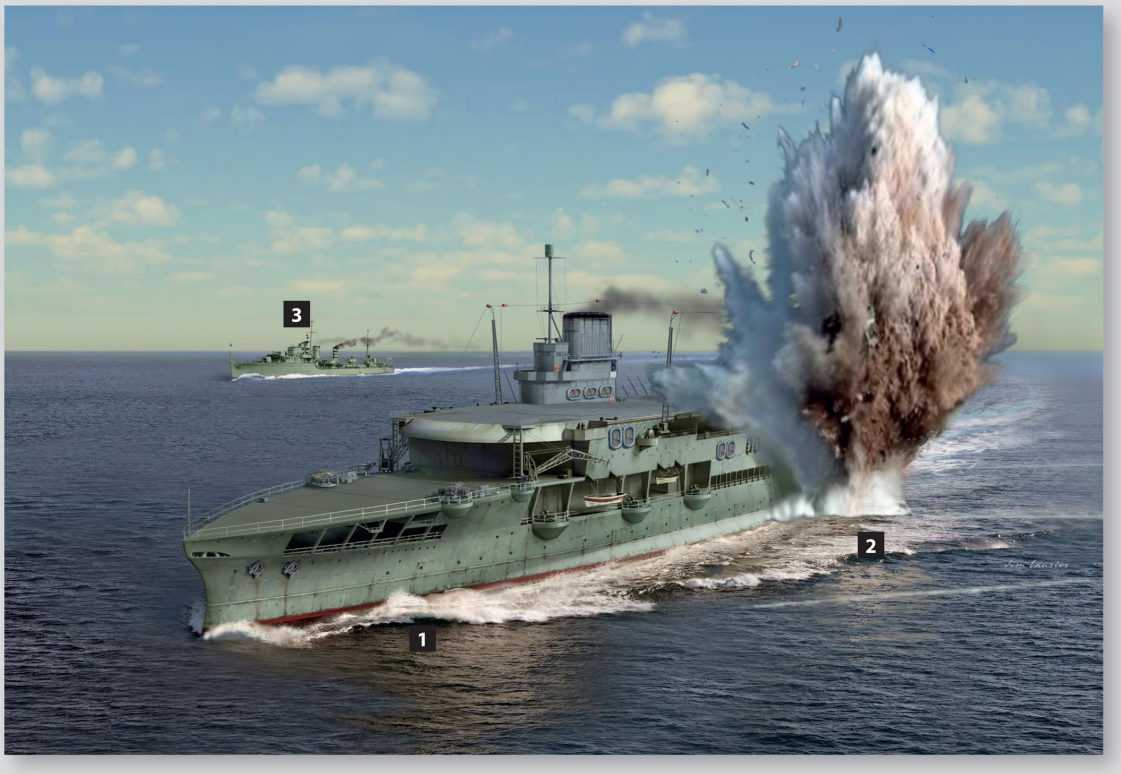
spread of three torpedoes at the carrier, and this time two hit. Within 20 minutes, the carrier sank with the loss of 519 crewmen. This was the end of using fleet carriers as part of submarine hunter groups in 1939. Once more expendable escort carriers were available, the concept was reintroduced with more success.

On 14 October, another disaster befell the RN. In a carefully planned operation, Dönitz dispatched *U-47*, under the command of Günther Prien, to attack the Home Fleet inside its main base at Scapa Flow. After a remarkable feat of navigation, Prien came across the unsuspecting battleship *Royal Oak*. Forced to make three separate attacks because of his malfunctioning torpedoes, Prien was rewarded for his daring when the last three hit the battleship, which went under with almost 900 of the crew. As a result, the Home Fleet was forced to abandon its principal base until its defences could be strengthened.

In the first few months of the shipping war, Dönitz decided to deploy his few available boats singly in the Eastern Atlantic. When the British instituted convoys, Dönitz was not surprised and decided to test his wolfpack tactic. In early October, the first wolfpack operation got under way with six boats deployed south of Ireland under the senior officer Werner Hartmann in *U-37*. Things went bad quickly when *U-40* was sunk by a mine when trying to use the English Channel and *U-42* and *U-45* were sunk by escorts on their way to the rendezvous point. With his three remaining boats, Hartmann attacked inbound Convoy HG 3 on 17 October when it was well west of Ireland and was unescorted. Each of the three U-boats was able to sink a single ship before being driven off by aircraft. Though not a smashing success, the basic concept of wolfpack attacks had been demonstrated.



U-47 arrives at Kiel on 23 October 1939 after sinking battleship HMS *Royal Oak* nine days earlier. In the background is battleship *Scharnhorst*. Under the command of Günther Prien, *U-47* was the tenth most successful U-boat in terms of tonnage sunk with 162,769 GRT in 30 merchants and *Royal Oak* at just under 30,000 GRT. (Naval History and Heritage Command)



THE LOSS OF *COURAGEOUS*, 17 SEPTEMBER 1939

An early indication that ASDIC might not be the game-changing technology that the Admiralty claimed it would be came on 17 September 1939. *U-29* under Otto Schuhart was on patrol in the Western Approaches some 190nm west of Ireland. He soon encountered RN carrier *Courageous* and two escorting destroyers. *Courageous* was one of two fleet carriers deployed to the Western Approaches as the centre of a 'hunter killer' group to seek out and destroy U-boats. The tactic was a disaster. At 1800hrs on 17 September, *Courageous* was sighted by *U-29* as the carrier was heading back to Devonport. Two of its destroyers had been dispatched just over two hours earlier to investigate a reported U-boat attack on a freighter, leaving just two to escort the carrier. Schuhart began to stalk his target, which he had identified as a carrier. *Courageous*, unaware of the presence of the submarine, was proceeding at high speed (20kts) **(1)** and was zigzagging and seemed to be on the verge of escape. Suddenly, at 1922hrs, the carrier changed course into the wind to recover aircraft and headed right for *U-29*. With this good fortune, Schuhart calculated his attack and launched three torpedoes at 1950hrs. After a running time of two minutes, two of the torpedoes struck *Courageous* **(2)**. This was the first indication the British had of *U-29*'s presence. The escorting destroyers made three depth charge attacks, none particularly close, and *U-29* escaped unharmed to report this success. *Courageous*' demise was quick; 19 minutes after being struck, it sank. The two torpedoes struck the carrier on the port side abaft the bridge. Power was lost and a severe list quickly developed. From the crew of 1,216 men, 518 were lost, including the captain, who remained on the bridge as the ship went down. For his part, Schuhart survived the war, having been assigned training duties in 1941, and later joined the post-war West German *Bundesmarine*. This scene shows the impact of the first torpedo. *Ivanhoe* or *Impulsive* is in the background **(3)**.

The following month, Dönitz ordered another wolfpack operation, this time with five boats. Again, only three boats were able to attack French Convoy KS 27 west of Gibraltar. The submarines did not score any success against the well-defended convoy, but hit stragglers and independent ships in the area, with two of the U-boats sinking seven merchants. These early attempts to use packs in October and November ended in failure, because the number of boats available to execute a true wolfpack attack was too small. It also became clear that the concept of a tactical officer in charge of the group attack was largely impractical. After flirting with the wolfpack tactic, Dönitz reverted to sending out individual boats as soon as they were ready. He hoped to employ wolfpack tactics in 1940 when more boats were available.

At this point in the campaign, it did not matter if wolfpacks were successful or not. The Atlantic still teemed with ships sailing independently, giving the few U-boats at sea plentiful targets. This state of affairs was true well beyond 1939 – it was not until 1943 that the majority of Allied shipping was placed in escorted convoys.

During the last four months of 1939, total Allied merchant losses to U-boat attacks were 114 ships totalling 421,156 GRT. However, of these, only 12 were lost in convoy and another four were lost after straggling from convoy. In exchange, nine U-boats were lost. It is important to note that for the last two months of 1939, German mines accounted for more losses than U-boat attacks. From the British perspective, the results of the opening round were not discouraging. Most importantly, losses of merchants in convoy were negligible, as indicated in the table below.

Losses to Allied Merchant Ships in Convoy, September–December 1939

Convoy route	Ships in convoy	Lost in convoy	Lost as stragglers	Lost out of convoy
HX (Halifax to Britain)	431	0	0	3
HG (Gibraltar to Britain)	473	0	0	3
OA/OB (outbound from Britain) OG (Britain to Gibraltar)	2,516	2	3	3
SL (Sierra Leone to Britain)	302	1	1	0

In the first two months of 1940, the total number of U-boats available and those on patrol were reduced. For those few boats on patrol, there were still plenty of targets in the form of ships steaming independent routes. Occasionally, U-boats spotted and tried to attack convoys. On 30 January, *U-55* attacked Convoy OA 80G and sank two ships. The alerted escort mounted a counter-attack and with the help of a Sunderland flying boat sank *U-55*. *U-41* went after Convoy OA 84 on 5 February and suffered a similar fate after sinking a single merchant. On 17–18 February, Dönitz mounted his third attempt to employ a wolfpack against a convoy under the control of a tactical commander. This time, five boats were earmarked for the operation under the command of Hartmann. Although the B-Dienst provided the location of two convoys west of Portugal, the wolfpack failed to assemble as planned. Only two U-boats were able to mount a joint operation, and they were unable to attack either convoy. Four stragglers or independents were dispatched.

Throughout 1941, when targets were plentiful in most areas, the length of a patrol for a U-boat was largely dependent on the number of torpedoes remaining. A Type VII boat, like that shown here, only carried 14 torpedoes. If possible, the deck gun was used to finish off crippled ships to avoid the use of a precious torpedo. Once a boat had exhausted its load of torpedoes, it might be ordered to remain at sea to report weather conditions in the Atlantic, which was useful information for German meteorologists. (Naval History and Heritage Command)

During the first two months of 1940, 85 ships were lost to U-boats, the highest losses of the war to date over a two-month period. Of these, only seven were in convoy, a clear indicator of the value of convoys and of the continued wealth of targets proceeding independently.

In March, the Germans turned their attention to preparations for the invasion of Norway scheduled for the following month. In the first six months of the Atlantic campaign, U-boats sank 199 Allied merchant ships. If not for the torpedo problem, probably another 50 to 60 ships would have been sent to the bottom. Sinking 199 ships seems like an impressive total, but it was only an average of some 116,000 GRT per month. This was far below what Dönitz estimated was required to bring Britain to its knees and far

below the peak German successes in World War I. At this point, British construction of merchant shipping was greater than its losses. Both sides had reason to be satisfied with the results of the first six months of the Atlantic campaign. The Germans had inflicted real losses on Allied shipping with only a handful of submarines. To the British, these losses in no way imperilled the viability of their trade routes. However, the British, beginning with Churchill, realized that the opening months of the campaign did not constitute the main German attack. The British were banking on their assessment that by the time the Germans increased U-boat construction, the RN would have enough time to deploy a significantly larger and more effective escort force.

U-boat losses had been fairly heavy during the first few months of the war, given the immature state of British defences. Fifteen were sunk in the Atlantic by February. Of these, nine were accounted for by convoy escorts. Early war British submarine hunter groups accounted for three, and aircraft for a single U-boat. It was obvious that the seemingly defensive concept of convoys was actually the most effective way to kill U-boats, since it forced the submarines to come to the most heavily defended sections of the ocean.

THE NORWEGIAN DIVERSION

One of the hallmarks of the campaign from the German perspective was the periodic diversion of U-boats for missions other than direct attacks on shipping in the Atlantic. The first major example of this was the Norway campaign from April to June in 1940. On 1 March, Hitler issued his directive for *Weserübung* – the occupation of Denmark and Norway. For the Kriegsmarine, this was a very risky operation, and one that required all its strength. As a result, the war in the Atlantic against British shipping was essentially placed on temporary hold.

For the Kriegsmarine to land troops successfully at several points in Norway, including as far north as Narvik, in the face of the much larger RN was an incredibly bold and even reckless operation. Commencing on 9 April, the Germans gained lodgements as planned and then established air superiority, which led to eventual victory. This risky operation resulted in heavy German losses – one heavy cruiser, two light cruisers, ten destroyers and four U-boats.

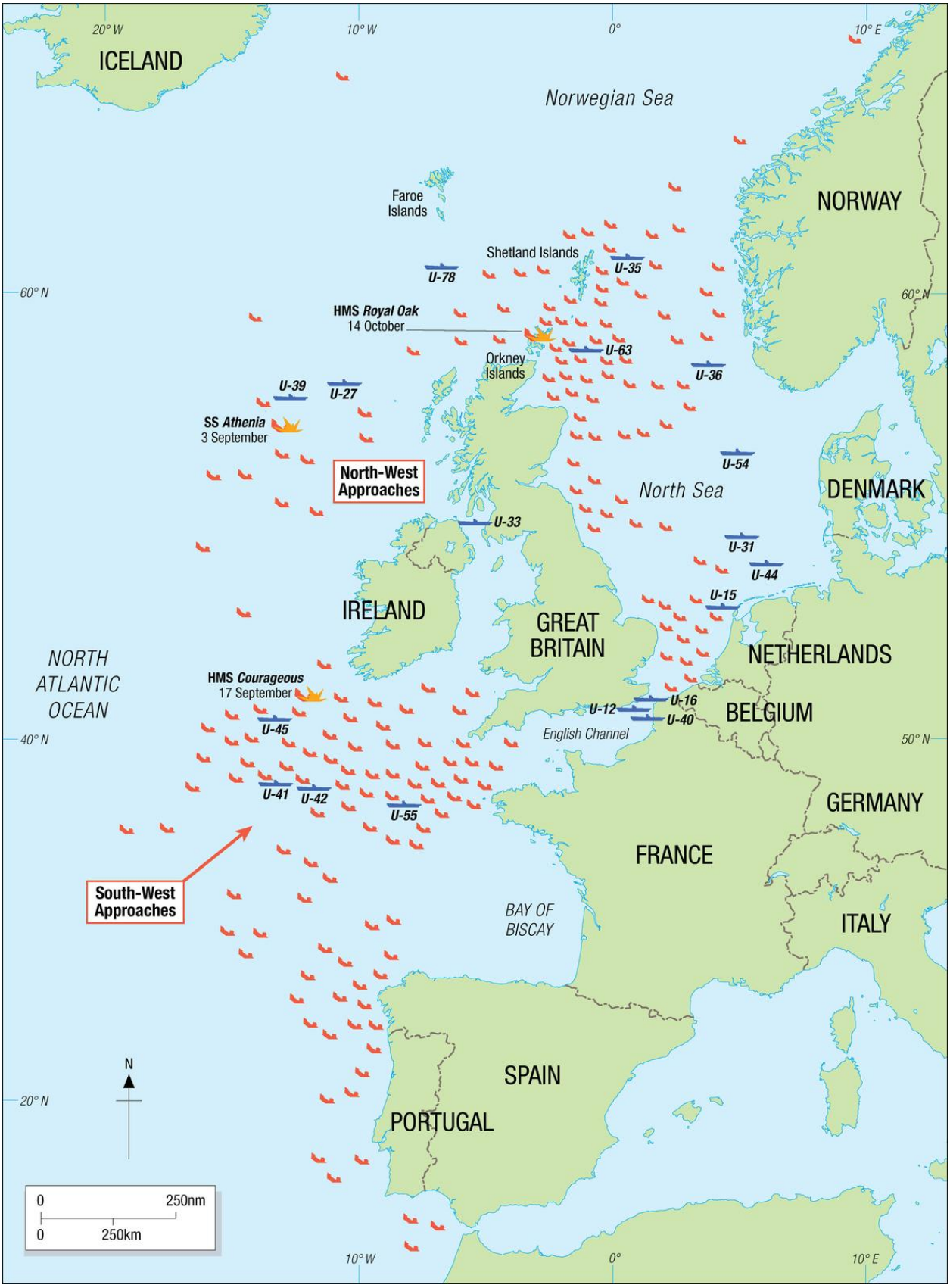
The impact of the campaign was significant. Virtually the entire ocean-going submarine force – 31 boats – was employed in the invasion of Norway.

This gave the shipping in the Atlantic a three-month respite. During this period, Allied shipping losses at the hands of submarines were light – only 23 in March, 7 in April and 13 in May. Of these, only 2, 4 and 9, respectively, were sunk in the North Atlantic. There was no compensation for the U-boat force by sinking RN warships or transports off Norway. U-boat attacks during the Norwegian campaign accounted for only one RN submarine and six other ships. Faulty torpedoes were the primary culprit for this lack of success. Reports from the frustrated U-boat skippers indicated that at least 20 certain torpedo failures were recorded against British warships and transports. In exchange for these scant successes, four U-boats were lost during the Norwegian campaign.

A significant side benefit of the Norwegian campaign for the Kriegsmarine was the occupation of the country and the opening of its ports and airfields for German use. For the U-boats, this meant they could circumvent the British blockade of the North Sea. Using Norwegian bases did not give the U-boats direct access to the Atlantic, but it dramatically reduced the difficulty of reaching their desired operating areas.

DÖNITZ PREPARES FOR THE NEXT PHASE

Conditions in the Atlantic campaign changed dramatically by the middle of 1940. German conquests of Norway and France eliminated the geographic constraints of trying to sortie U-boats from the North Sea from which all exits were patrolled by the RN. Transiting from bases on the North Sea to the Western Approaches took at least nine days and consumed roughly a third of a Type VII's fuel; operating from France, transit time and fuel expenditure were greatly reduced. After the armistice with France in June 1940, Dönitz moved quickly to open French bases for his U-boats. Operating from bases in France, U-boats had direct access to the Atlantic. By July, U-boats were using Lorient for resupply. The following month, the shipyard in Lorient was placed back in operation under German supervision for the overhaul of submarines. In time, it proved more efficient than German shipyards. Final proof that the centre of gravity for U-boat operations had shifted to France was provided when Dönitz moved his headquarters to Kernevel Point, adjacent to Lorient.

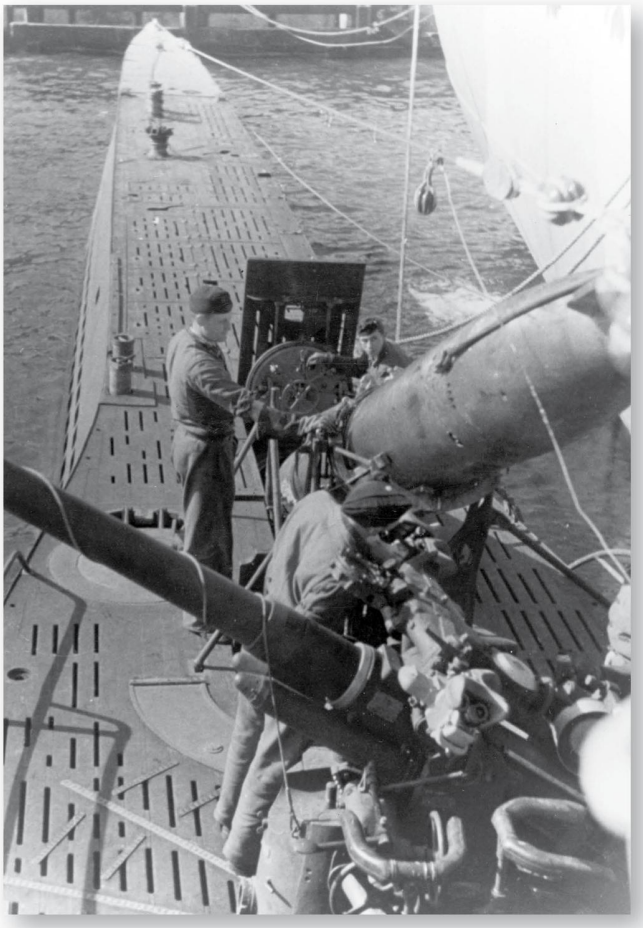

20° W
10° W
0°
10° E
ICELAND
Norwegian Sea
NORWAY
Faroe Islands
Shetland Islands
U-78
U-35
60° N
HMS Royal Oak
14 October
U-63
Orkney Islands
U-36
U-39
U-27
SS Athenia
3 September
North-West Approaches
U-54
North Sea
DENMARK
U-33
U-31
U-44
U-15
IRELAND
GREAT BRITAIN
NETHERLANDS
NORTH ATLANTIC OCEAN
HMS Courageous
17 September
U-16
U-12
U-40
BELGIUM
U-45
English Channel
40° N
50° N
U-41
U-42
U-55
GERMANY
FRANCE
South-West Approaches
BAY OF BISCAY
ITALY
SPAIN
N
PORTUGAL
20° N
0
250nm
0
250km
10° W
0°
10° E

Merchant and U-boat losses, September 1939–May 1940

All 24 Type VIIB boats were completed by early 1940, making them a mainstay in the opening phases of the Atlantic campaign. With an additional 33 tons of fuel, these boats possessed an increased range of 8,700nm, which enabled them to operate well into the Western Approaches. Note the 88mm deck gun forward of the conning tower. Many of the top aces achieved their scores in Type VIIB boats. (Naval History and Heritage Command)

Even with the reduced state of British anti-submarine defences during the second half of 1940, the Kriegsmarine lacked the means to take full advantage. Raeder and Dönitz fought a continual battle with Hitler and the German army and air force to allocate additional resources to the expansion of the U-boat fleet. The basic constraint was that the German war economy was inadequate to support a multi-front war. Until July 1940, expansion of the U-boat force was not seen as a top priority.

During the last four months of 1939, Dönitz lost nine boats; during the first half of 1940, another 18 were lost. Production of new boats was not keeping up with losses. In part because of the unusually cold winter of 1939/40, production was not as robust as expected. Only seven boats were delivered in the last months of 1939 and 13 during the entire first half of 1940. This translated into a net reduction of the U-boat force by seven boats.



The crew of a Type VIIC loads a G-7 torpedo. On the Type VII boat, a torpedo was loaded into the four bow tubes and the single stern tube. Up to nine spare torpedoes could be carried internally. Both variants of the G-7 were straight running. The G-7a was driven by super-heated steam and had a top speed of 44kts. It left a visible wake. The G-7e was an all-electric torpedo that was simpler, cheaper to build and was wakeless. It required more maintenance and possessed a shorter range. Both variants were carried on German submarines at the start of the war. (Naval History and Heritage Command)

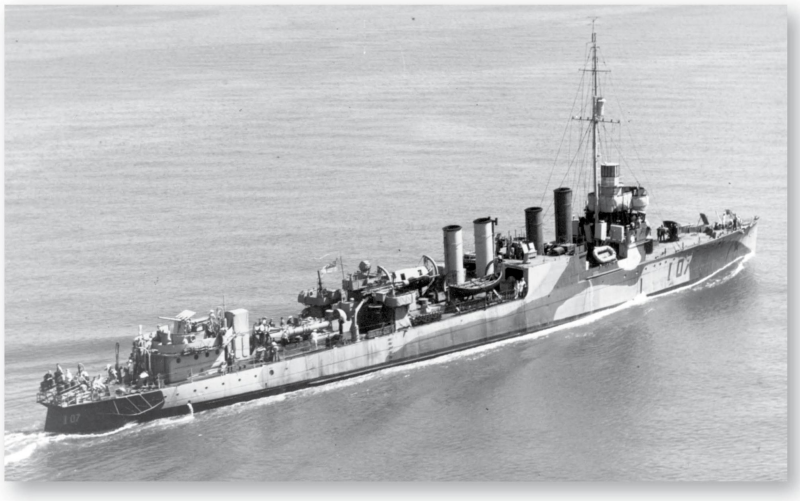
From 1 June 1940 until 31 March 1941, 72 boats were commissioned. Since losses during this period was only 13 boats, the total force increased to 109. However, there were growing pains during this expansion, as some boats had to be retired from front-line service for training purposes and many of the new boats were still in the process of sea trials and crew training. The Norwegian campaign had another result – after it was concluded, the participating U-boats required an overhaul. The effect of all these factors resulted in the decline of boats in the North Atlantic. In January 1941, there were a mere eight boats on station in the entire Atlantic, the lowest point in

the entire campaign. The total number of boats on front-line duty fell to 22 in February 1941 – also the lowest level of the war. The total U-boat force was up to 89, but most of these were either conducting trials or devoted to training in the Baltic Sea. Monthly production for the preceding quarter was less than eight boats per month.

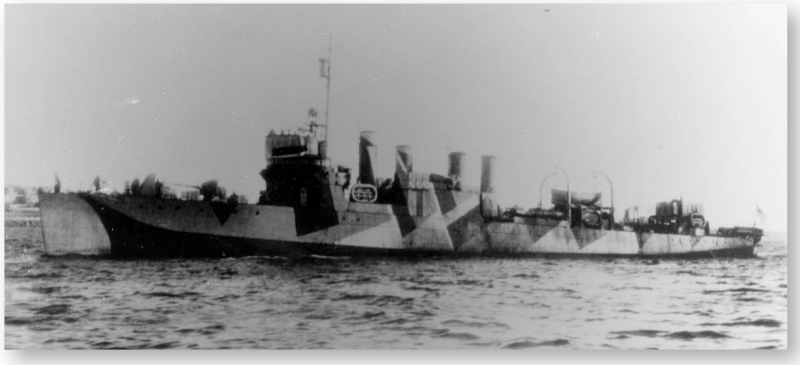
Another issue reducing the effectiveness of the U-boats was the unreliability of their torpedoes. The difficulty of American submarine torpedoes during the first years of the war is well known, but the Germans faced a similar issue that took almost as long to address. The standard German torpedo, the G7, possessed both contact and magnetic detonators – both had severe problems. The magnetic detonator offered great promise as it was designed to explode under a ship, which increased its explosive effect. But as early as September 1939, it was apparent that the magnetic detonator was faulty. All too often it exploded well short of the target. Aside from resulting in the failure of the attack, it also served to alert the defenders to the presence of a U-boat, and on several occasions the boat was lost as a result. As early as 2 October 1939, Dönitz ordered that only torpedoes with contact detonators be used, but soon it was clear that these also had issues. Because of a leak in the depth-control mechanism, the torpedo ran too deep. The contact fuse for the torpedo failed to operate if the torpedo struck the target at an angle of less than 50 degrees, well below its supposed capability of exploding, even if it struck at 21 degrees.

THE BRITISH PREPARE

During the months following the fall of France, the RN was stretched to its limit. Losses to destroyers and other escort ships had been heavy during the Norwegian campaign and the evacuation of the British Expeditionary Force from France. After the fall of France, Britain was exposed to the real threat of invasion. This required the Admiralty to retain large numbers of destroyers in home waters to repel any invasion. All this reduced the number of destroyers and other escorts available for convoy protection. Until October 1941, lack of escorts forced the RN to reduce the coverage of escorts for convoys departing from and arriving to Britain. The increased threat of air attack from bases in France also forced shipping to stop using the approaches south of Ireland after 15 July. As a result, all shipping was forced to use the North Channel into the Irish Sea, making it easier for U-boats to find targets.



HMS *Roxburgh* was one of the 50 ex-USN destroyers provided to Britain in 1940. Many of these were modified by the British before entering service in the RN. This 1942 view of *Roxburgh* shows the ship after most of its original USN armament had been removed in favour of additional anti-submarine and anti-aircraft weapons. Note the Type 271 radar fitted on the bridge. (Naval History and Heritage Command)



HMS *Hamilton* was an American destroyer handed over to the RN on 23 September 1940. Following repairs from a collision, it was given to the RCN in July 1941. *Hamilton* was one of the 50 ex-USN destroyers given to the RN at a critical point in the Atlantic campaign. (Naval History and Heritage Command)

Despite shipping losses up to this point, British commerce was not significantly impacted. Only in June and October 1940 did losses surpass 300,000 GRT. This was far below the worst losses recorded during World War I.

In contrast, British defences were thickening. On 5 September, an agreement was reached with the United States for the transfer of 50 destroyers in exchange for the use of eight bases in the Western Hemisphere,

namely in the Caribbean and Bermuda. Within the month, eight were turned over to the RN, and by the end of the year, most arrived in Britain. In November, the first radar was installed on British destroyers. Coastal Command was also gathering strength and in April 1941 began to fly missions from bases at Reykjavik and Kaldadarnes in Iceland.

THE BATTLE RESUMED

Following the pause in U-boat operations in the Atlantic during the Norwegian campaign, on 15 May 1940 the first U-boats departed their bases to resume the attack on British sea lanes. Since the South-West Approaches were closed, forcing all inbound shipping to be funnelled through the North Channel into the Irish Sea, Dönitz concentrated his available boats on the approaches to the North Channel.

By mid-August, nine boats were operating in this area. Using newly acquired bases in Norway, even the short-range Type II boats were able to take part in the campaign. Usually, it was difficult for the Germans to find convoys with only a few boats on station. In this instance, the convergence of convoys and independently routed ships into the North-West Approaches made the problem much simpler. In August and September, some 100 ships were sunk in this area.

Following the Norwegian campaign, *U-37* was the first to return to the Atlantic. Between 19 May and 2 June, while operating west of the Bay of Biscay, it sank nine merchants. In late May, five boats were deployed to form the first named wolfpack – the *Rösing* pack. In the middle of June, the boats operated together north-west of Cape Finisterre against troop Convoy US 3. No success was recorded against the heavily defended convoy, but during this deployment, the five boats sank a total of 27 ships. Two of them covertly refuelled and took on water and foodstuffs from a German supply ship in Vigo, Spain, during their deployments. These replenishment operations, a blatant breach of Spanish neutrality obligations, were to continue periodically throughout 1944.

A second wave of seven boats departed in the first week of June to operate west of the English Channel and in the Bay of Biscay. While en route to their assigned patrol areas, the group encountered other convoys west of the British Isles. Attacks against the convoys were not lucrative, but there were still many other targets. The seven boats accounted for 32 ships of over

170,000 GRT. From this group, *U-30* was the first U-boat to enter Lorient on 5 July.

Life for both Allied and German submarine crews participating in the Atlantic campaign was both brutal and monotonous. For the Germans, the approximately 44 men on a Type VII submarine lived together in a cramped hull until fuel or torpedoes ran out and the patrol concluded. In this view, a member of the U-boat bridge crew surveys the ocean for targets. With no radar, finding the enemy was largely dependent upon the visual acuity of the watch. (Naval History and Heritage Command)

Dönitz's tonnage war played out wherever he thought British defences were weak. One of these areas was the South Atlantic, which was beyond the range of most U-boats. The first boat ordered to patrol in this area was *U-A*, a Type IX boat modified to Turkish requirements but commissioned into the Kriegsmarine in 1939. Departing on 11 June, it ranged as far south as Freetown where it was replenished from an auxiliary cruiser on 19 July. All told, seven ships (over 40,000 GRT) were sunk during this deployment.

In mid-June, Dönitz prepared a third wave of eight U-boats for operations in the North Channel and off Cape Finisterre. This group feasted on independent ships, while occasionally attacking convoys. The tally for these boats was 23 ships sunk, including one destroyer. However, the RN exacted a high price. On 23 June, Flower-class corvette *Arabis* probably sank *U-122*, marking the first success for a ship of this class. On 1 July, V-class destroyer *Vansittart*, part of the escort for Convoy SL 36, sank *U-102*. The same day, *U-26* attacked Convoy OA 175, sinking one ship and damaging another. However, another Flower-class corvette, supported by a Sunderland, sank the U-boat before it could exact any more damage. When either low on fuel or out of torpedoes, the U-boats were forced to break off their deployments. Four of the surviving boats of this group arrived at Lorient.

Between 10 and 23 July, five Type IIC boats were deployed off the North Channel. Only six ships were sunk before the boats were forced to return to base. In late July, four of the boats based at Lorient deployed to the waters off the North Channel. *U-34* sank four ships in Convoy OB 188 between 26 and 27 July. From 28 to 31 July, *U-99*, under the rising star Otto Kretschmer, sank four ships and then, on 2 August, dispatched three tankers from OB 191. The other two boats also attacked convoys successfully.

In response to the Germans using French ports, the RN began to deploy submarines off German-occupied ports in the Bay of Biscay in late July. On 20 August, *Cachalot* sank *U-51*.

In August, four submarines were deployed from Germany and five from Lorient in the North Channel. Each of the boats enjoyed some success against ships steaming independently and in convoys. No U-boats were lost to British counter-attacks, but on its return to Germany, *U-57* collided with a Norwegian freighter north-west of Hamburg on 3 September and was lost (though it was raised and returned to service in January 1941).

THE FIRST HAPPY TIME

The summer of 1940 was a period of German success in the Atlantic campaign. So extraordinary was this period that U-boat crews called it the ‘Happy Time’. It was also during this period that Dönitz’s wolfpack tactic began to work. The first really successful wolfpack operation took place over three days from 6 to 8 September against Convoy SC 2. The convoy had 53 ships and an escort of two destroyers, two sloops, one corvette and two ASW

trawlers. Dönitz received cueing information from B-Dienst on 30 August and had time to deploy four boats against the convoy. The battle opened on 6 September when the escorts drove the first encroaching U-boat away. Just before midnight, two boats tried again, and this time Prien's *U-47* penetrated the screen to sink three freighters. The following day, long-range flying boats gave the convoy a day of respite. On 8 September, the first two U-boats again pressed their attacks and Prien torpedoed another ship. Later that night, two more boats arrived, and *U-28* sank another ship. This was a case study of U-boat tactics and why the British were unable to counter them. All attacks against the convoy were made at night on the surface. As such, sonar aboard the escorts was useless. On a dark night, and with the small silhouette of the U-boats, spotting them was very difficult. As a result, Convoy SC 2 lost five ships of almost 21,000 GRT without loss to the Germans.

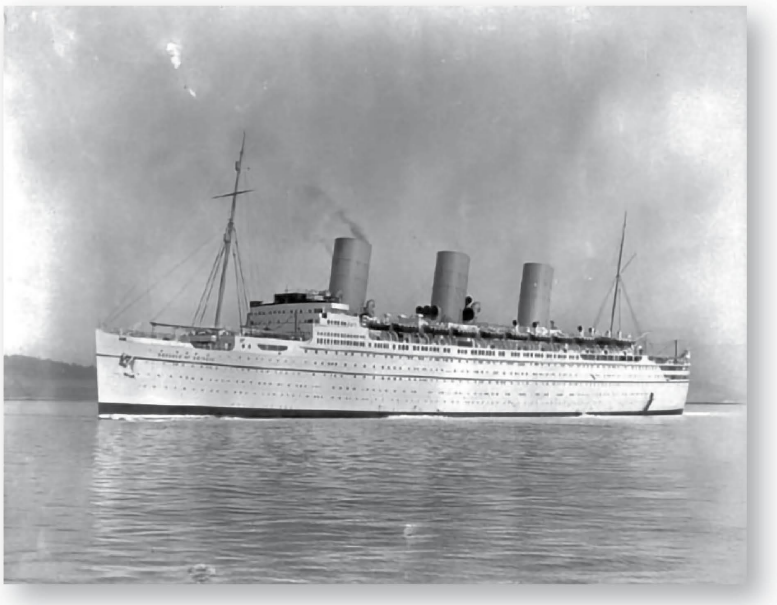
In this image, Fritz-Julius Lemp, captain of *U-30*, is awarded the Knight's Cross of the Iron Cross on 14 August 1940 by Dönitz. Lemp was a controversial figure known for his role in the *Athenia* incident and for the loss of his second boat, *U-110*, which gave the British a major intelligence victory. He was also a successful U-boat commander with 20 ships sunk (96,639 GRT). (Naval History and Heritage Command)

AN ACE STRIKES, 21/22 SEPTEMBER 1940

Convoy HX 72 departed Halifax on 9 September 1940 with 43 ships. As was the norm for this period of the war, the initial escort for a convoy headed to Britain was an armed merchant cruiser (in this case *Jervis Bay*) for protection against surface raiders until it reached the Western Approaches and picked up an anti-submarine escort. On 20 September, *Jervis Bay* departed to escort a westbound convoy. Since the anti-submarine escort was not scheduled to meet the convoy until the afternoon of 21 September, HX 72 was entirely unescorted when it was spotted by *U-47* at dusk on 20 September. In response, Dönitz ordered another five boats to converge on HX 72. The first to make contact at about midnight was *U-99*. Otto Kretschmer's boat launched an attack and hit three ships. The following day, more boats joined the attack, including *U-100* under Joachim Schepke and *U-48*. *U-48* attacked from outside the convoy, but only succeeded in damaging a single ship. As scheduled, the British escort, comprising a destroyer, a sloop and three corvettes, joined the convoy in the afternoon, giving the convoy a brief respite. After dark, Schepke began his attack. He boldly slipped inside the columns of the convoy to make his attacks from close range in order not to waste a single torpedo. Within minutes, three ships were torpedoed. The escorts searched for the attacker without success since *U-100* was already inside the convoy. Schepke struck again just after midnight. This time, three more ships were torpedoed, but *U-100* was spotted and forced to break off its attack. Later, Schepke sank a seventh ship. This scene depicts *U-100* on the surface making its midnight attack **(1)**. One ship has

already been torpedoed and is on fire **(2)**. The second had just been hit by one of Schepke's torpedoes **(3)**. In total, HX 72 lost 11 ships, seven to Schepke.

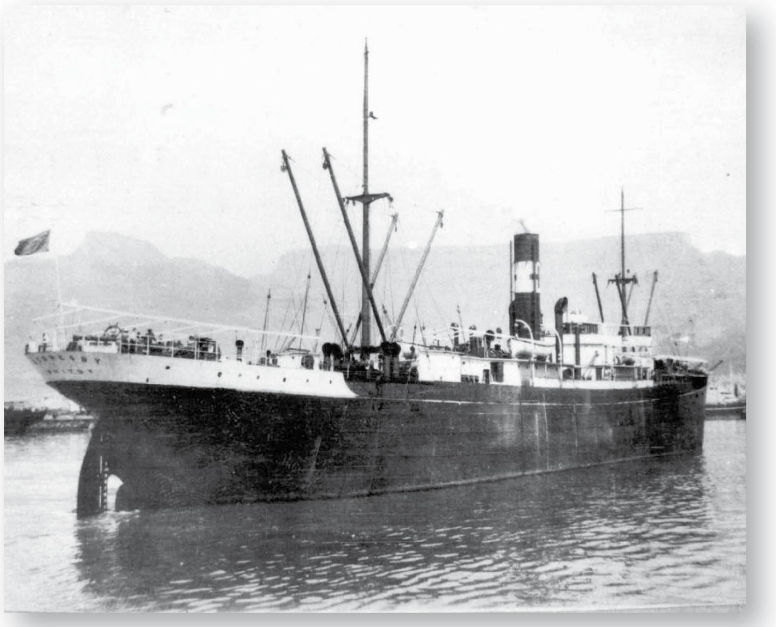
The four boats that had attacked SC 2 were joined by another six and continued operations off the North Channel. In mid-September, three boats attacked three different convoys. On 20 September, Prien spotted Convoy HX 72 and maintained contact, allowing Dönitz to order another five boats to join the attack. Kretschmer in *U-99* opened the assault on the convoy later that day before the escort group reached the inbound convoy. He torpedoed three of the convoy's 43 ships, all of which eventually sank. *U-48* sank another ship early on 21 September before the escort group of one destroyer, one sloop and three corvettes finally arrived. With the destroyer assigned to assist the previously torpedoed ships, only four escorts remained to protect the convoy. After darkness on 21 September, Joachim Schepke in *U-100* began a virtuoso performance. Over four hours, Schepke torpedoed seven ships amounting to over 50,000 GRT. When the carnage was over, HX 72 had lost 11 ships of almost 73,000 GRT. September was the most successful month to date for the U-boats with a total of 59 ships sunk for a total of 295,335 GRT.



The fate of the *Empress of Britain*, a 42,348 GRT passenger liner, provided testimony to the potential of coordination between the U-boat force and the Luftwaffe. On 26 October 1940, the ship was struck by bombs from a single Fw 200. Alerted to the presence of the burning ship, *U-32* was vectored to finish it off. (Author's collection)

From late September to mid-October, ten U-boats took up patrol off the North Channel. All but two of these boats gained some level of success. As during the previous month, Dönitz was able to mass his boats on convoys and achieved several successes. The first began when *U-48* spotted Convoy SC 7 with over 30 merchants on 17 October. The convoy was initially only lightly protected with two sloops and a corvette, but the escort was later reinforced with another sloop and a corvette. What was to become a massacre began later on 17 October when *U-48* sank two ships. Upon receipt of *U-48*'s contact report, Dönitz set up a patrol line with five more boats. On the evening of 18/19 October, the convoy ran into the patrol line. All six boats were able to launch attacks during the night, some more than once. In total, 20 ships from Convoy SC 7 were sunk and three damaged. Kretschmer's *U-99* was the most successful boat with six ships sunk and another torpedoed. Again, the small escort was unable to contend with the bold attacks of the German submarines mounted on the surface.

Just a day later, it was the turn of Convoy HX 79 to be subjected to concerted attack. The large convoy of 49 ships looked to be well defended with two destroyers, four corvettes, three ASW trawlers, one oceangoing minesweeper and a submarine. *U-47* was the first to spot the convoy and by the night of 19/20 October, four more boats had arrived to join Prien's attack.

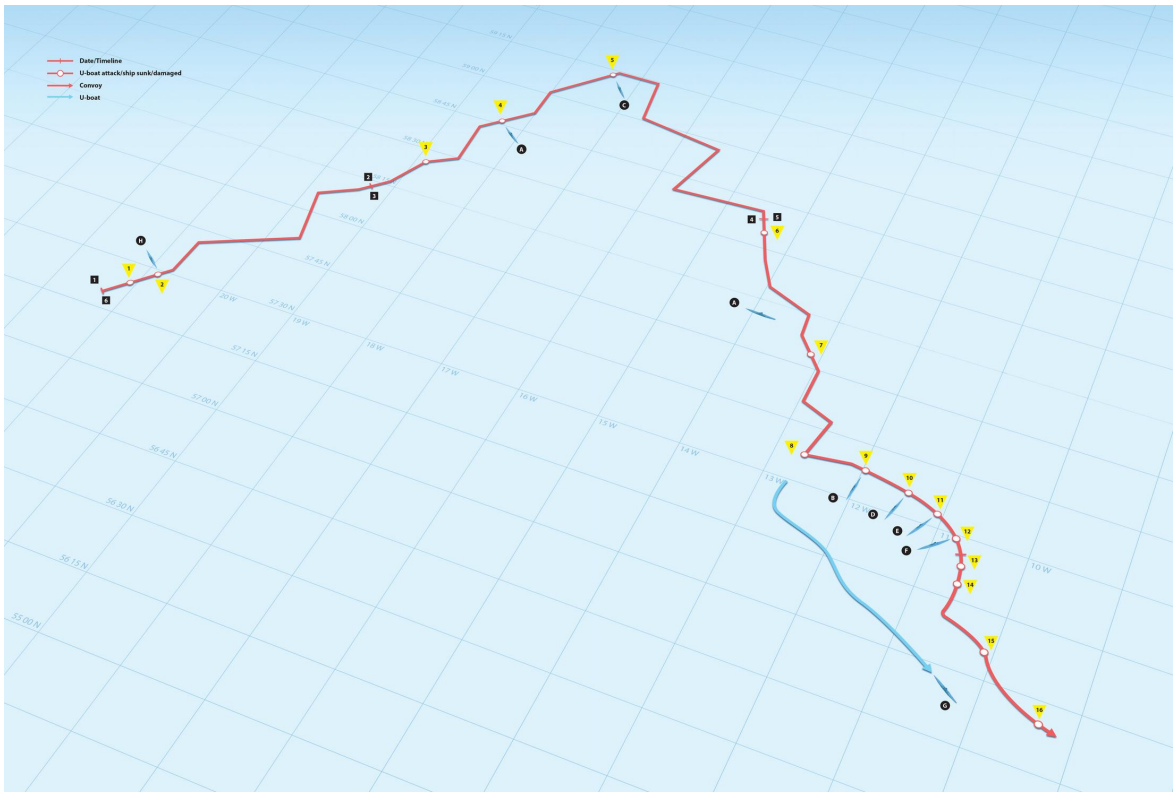


SS *Scoresby* was a typical merchant ship plying the North Atlantic in the first phases of the Atlantic campaign. Capable of only 8.5 kts, *Scoresby* was placed in an SC convoy. While part of SC 7, it was torpedoed by *U-48* and sunk. The entire crew was rescued by an escort. (Author's collection)

All five boats scored heavily with *U-47* penetrating the convoy to sink three ships and torpedo three more. During the night, 12 ships of just over 75,000 GRT were lost. Most submarines were out of torpedoes after the two big convoy battles, leaving only a handful in the Atlantic for the remainder of the month. Kretschmer scored another major success on 3 November west of Ireland when he sank two auxiliary merchant cruisers totalling 30,000 GRT.

THE SLAUGHTER OF SC 7

Between 16 and 19 October 1940, a group of eight U-boats, led by some of the top-scoring German submarine commanders, attacked Convoy SC 7 and inflicted the heaviest loss to a single convoy during the war. No U-boats were sunk or even damaged in this action.



GERMAN FORCES

A. *U-38* (Type IX boat) (Heinrich Liebe)
B. *U-46* (Type VIIB) (Engelbert Endrass)
C. *U-48* (Type VIIB) (Heinrich Bleichrodt)
D. *U-99* (Type VIIB) (Otto Kretschmer)
E. *U-100* (Type VIIB) (Joachim Schepke)
F. *U-101* (Type VIIB) (Fritz Frauenheim)
G. *U-123* (Type IXB) (Karl-Heinz Moehle)
H. *U-124* (Type IXB) (Georg-Wilhelm Schulz)

ALLIED FORCES

1. Convoy SC 7 with 35 ships arranged into six columns
2. HMS *Bluebell* (Flower-class corvette)
3. HMS *Fowey* (Shoreham-class sloop)
4. HMS *Heartsease* (Flower-class corvette)
5. HMS *Leith* (Grimsby-class sloop)
6. HMS *Scarborough* (Hastings-class sloop)

EVENTS

16 October

1. Of the 36 merchant ships originally in convoy, 35 remain. The only escort is sloop ***Scarborough***.

2. ***U-124*** sinks Canadian ship ***Trevisa*** when the ship lags behind. Just 14 survivors are later rescued by ***Bluebell***.

17 October

3. ***Fowey*** and ***Bluebell*** arrive to reinforce the escort.

4. ***U-38*** sinks the Greek ship ***Aenos***.

5. ***U-48*** spots SC 7 and fires a salvo of three torpedoes; one each hits ***Languedoc*** and ***Scoresby***, third torpedo misses. ***Languedoc*** is assessed to be beyond repair and is sunk by gunfire from ***Bluebell***. The crews of both ships are rescued by ***Bluebell***. ***Scarborough*** attacks ***U-48*** with depth charges but afterward loses contact with the convoy.

18 October

6. ***Leith*** and ***Heartsease*** arrive to reinforce the escort.

7. ***U-38*** torpedoes British ship ***Carsbreck***; ***Leith*** and ***Heartsease*** conduct depth charge attacks with no success. ***Heartsease*** is assigned to escort the damaged ship back to port and it survives.

8. Six U-boats attack SC 7 over the span of six hours during the night of 18/19 October. Most of the attacks are made on the surface from within the convoy.

9. ***U-46*** sinks ***Beatus***, ***Convallaria*** and ***Gunborg***.

10. ***U-99*** sinks ***Empire Miniver***, ***Fiscus*** and Greek ship ***Niritos***.

11. ***U-100*** damages Dutch ***Boekelo*** and ***Shekatika***.

12. ***U-101*** damages ***Blairspey*** and sinks ***Creekirk*** at 2112hrs with the loss of all hands.

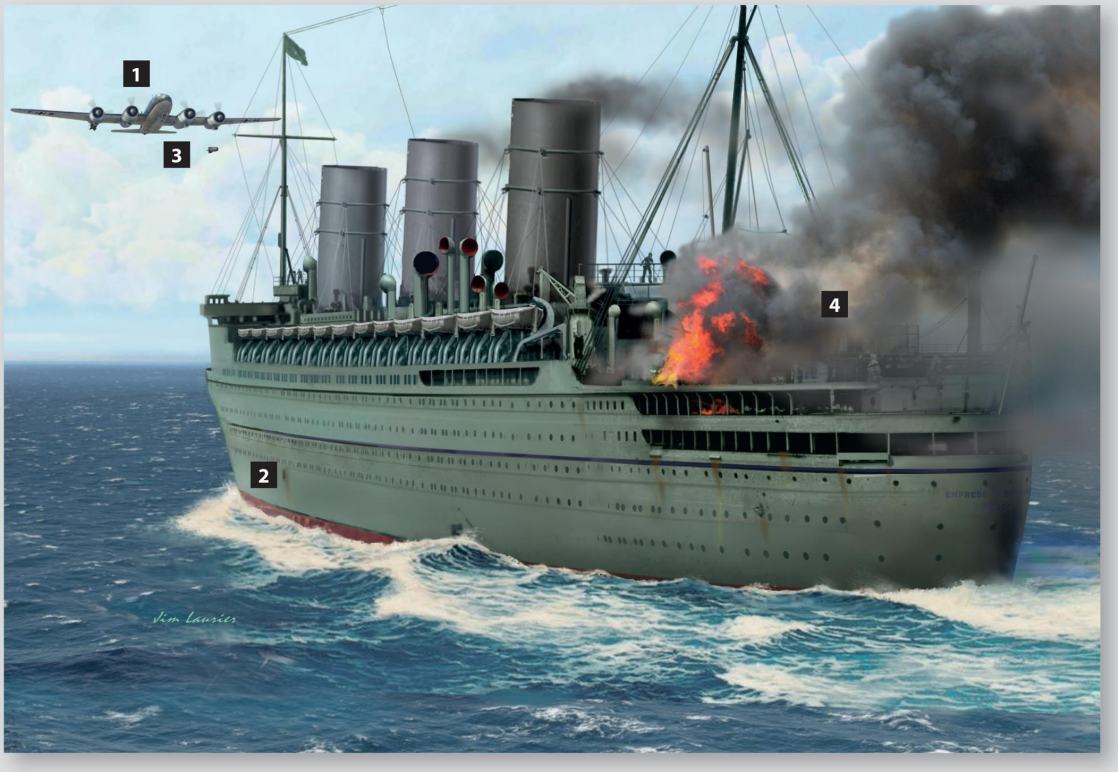
19 October

13. 0122hrs: ***U-101*** fires three torpedoes, followed by a fourth. One hits ***Assyrian***, and another ***Soesterberg***, both of which later sink. Another merchant ship spots the boat and opens fire; it avoids torpedoes by turning away.

14. ***U-99*** sinks ***Empire Brigade***, Norwegian ***Snefjeld*** and Greek ***Thalia***. ***Clintonia*** is damaged.

15. ***U-123***, on its first patrol, sinks four ships. ***Clintonia*** straggles behind after being damaged; it is shelled and sunk by ***U-123***. ***Sedgepool*** is sunk by torpedoes. ***Boekelo*** and ***Shekatika***, first torpedoed by ***U-100***, are finished off by ***U-123.***

16. Germans break off attacks to go after Convoy HX 79, which had caught up with SC 7. In total, eight different U-boats sink 20 ships and damage three. No U-boats are lost or damaged. Only 15 ships reach Britain, including the three damaged ones.



THE CONDOR STRIKES, 26 OCTOBER 1940

Beginning in 1940, German Fw 200 Condor long-range reconnaissance bombers from I/KG40 operated over the waters west of Britain **(1)**. On 26 October, a Condor flown by Bernhard Jope encountered the passenger liner *Empress of Britain* 70nm north-west of

Ireland **(2)**. At 42,348 GRT, the *Empress of Britain* was Britain's second-largest ship and the tenth-largest merchant ship in the world. Jope spotted a very large ship through the clouds and changed course to make a low-level attack from astern. In the first attack run from about 650ft, he dropped a single 551lb bomb which hit the ship port side and started a fire. Jope made a wide turn to make another stern attack. Flying through what he described as stronger defensive fire than the first pass, he dropped another bomb, which missed. The next two passes were made from ahead of the target to avoid the heavy defensive fire from astern **(3)**. Altogether, four 551lb bombs were dropped and two hit. When the Condor left the area, *Empress of Britain* was aflame and showed a slight list. Following the attack, the ship's captain ordered it to be abandoned, leaving only a skeleton crew aboard. This was accomplished, but Jope's message that the ship was still afloat prompted orders to *U-32* to proceed to the scene and finish off the huge liner. Under the command of Hans Jenisch, *U-32* arrived to find the liner under tow and under air and naval protection. After stalking the target for nearly 24 hours, Jenisch got into position to launch a total of three torpedoes, of which two hit. In the early hours of 28 October, *Empress of Britain* slipped under the waves, becoming the largest British ship lost during the war. This scene shows the liner under attack during Jope's third attack run. The Fw 200 is approaching the ship from ahead. Note that the ship is already on fire aft but is still under way **(4)**.

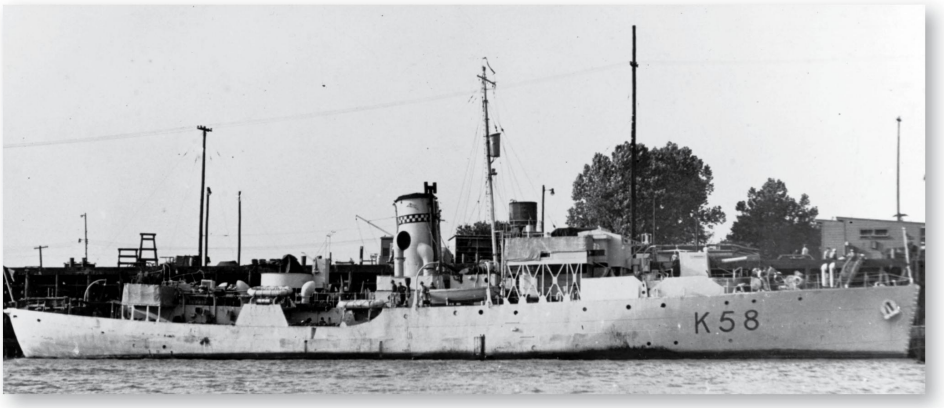
After the final tally was taken, October 1940 had become the most successful month thus far for the U-boats. In total, the U-boats sank a total of 63 ships (352,407 GRT), with the highlights being the two major convoy battles.

In the winter of 1940, the number of boats on patrol declined, but the Germans continued to score heavily against weakly defended convoys. In November, seven boats were deployed to the area west of the North Channel with another two farther to the west on weather duty. In the middle of the month, *U-137* sank three ships in outbound convoys. One of the convoys was targeted by ace boats *U-47* and *U-100*, without success. A Sunderland flying boat equipped with ASV Mark I radar was instrumental in this Allied success. This was the first incident of aerial radar being used to detect a U-boat and provided a portent of the impact of aircraft-mounted radar.

Outbound Convoy OB 244 came under attack from *U-103* on 21 November. After sinking two ships, the U-boat was driven off by a Flower-class corvette. Two days later, *U-123* found the same convoy as it was dispersing and sank four ships. At about the same time, *U-100* detected Convoy SC 11 with an escort of a single sloop and sank seven ships. Aside from Schepke in *U-100* sinking seven ships of 24,601 GRT, other boats with impressive scores during the months included *U-103* with eight ships of

43,651 GRT, and *U-123*'s six ships of 27,536 GRT. In return, *U-104* was sunk by a mine north-west of Ireland.

In the latter half of November and into December, only five boats were on patrol in the North Atlantic (another three were on weather duties). One of the submarines detected Convoy HX 90 just before the arrival of its escort group. Three boats were able to attack the undefended convoy on the night of 1/2 December. Surprisingly, the carnage was limited to five ships sunk and another four more torpedoed and damaged (one was later sunk by another U-boat). The next afternoon, a different U-boat found the convoy and sank two more ships. On 11/12 December, *U-96* sank four ships from Convoy HX 92. In addition to the convoy attacks, many independent ships were located and sunk. Losses during the month were heavy – 37 ships of 212,590 GRT.



Most Flower-class units served in the RN. Nine were given to the Free French Navy. *Aconit*, pictured here, established a fine war record from July 1941 until the end of the war. In addition to the RN and the Free French, nine other Allied navies operated Flower-class corvettes during the war, including the RCN and the USN. (Naval History and Heritage Command)

Merchant and U-boat losses, June 1940–March 1941

Dönitz kept the pressure on in other areas beyond the North Atlantic. Type IXB boat *U-65* deployed on 15 October and headed for a patrol area off West

Africa. With the assistance of a supply ship, it conducted an extended deployment in the South Atlantic until early January. During this deployment, *U-65* sank eight ships of 47,785 GRT and damaged another.

As the U-boat crews enjoyed the Happy Time, there were signs that British defences were growing more effective. The numbers of escorts continued to rise as more corvettes entered service and destroyers were released from anti-invasion duties. In June–July, at the height of the escort shortage, even large convoys had only a single ASW escort. In November, the average escort rose to two ships. Beginning in early 1941, escorts received an important technological boost in the form of the Type 286 radar. It was fairly primitive: with no rotating antenna the escort had to manoeuvre to cover the target area. When it worked, ranges up to 20nm were recorded. Another technical improvement was the introduction of improved illumination rounds, which would make it easier to spot U-boats on the surface at night. Also in mid-1941, HF-DF systems were deployed on escorts. Given the volume of U-boat radio communications, this was an invaluable aid to provide U-boat locations in the vicinity of a convoy. The Germans thought that such a system could not be made small enough to fit aboard small escorts, so they made no attempt to reduce the volume of the radio traffic. Escorts also received radio-telephones, increasing their tactical coordination.

Most importantly, it was now painfully obvious that the effectiveness of the escorts rested primarily on better organization and training. In 1941, permanent escort groups were created. Every effort was made to keep the groups together even when they fell well below their full strength of eight ships. The second game changer was improved training. ASW training was moved from Portland to Western Approaches Command's new Anti-Submarine Training School at Tobermory on the Isle of Mull. Beginning on 1 July 1940, every new escort received one month of intensive ASW training. Following this, the ship joined its group for more training as part of the group. An ASW tactics school was also established at Derby House in Liverpool to train officers in an escort group in various tactical scenarios.

As the threat of invasion ebbed, Coastal Command began to shift its focus back to the Atlantic. After the fall of France, Coastal Command's priority was to watch the North Sea and English Channel for signs of a German invasion. Coastal Command's force level increased slowly, with better aircraft entering service. Given its long range and heavy payload, the Sunderland was particularly effective. It was the first aircraft to receive radar with the

introduction of the ASV Mark I in the autumn of 1940. Against a submarine-sized target, the original set possessed only a 3–6nm detection range, depending on the aircraft's altitude. At the end of 1940, 25 Sunderlands and 24 Hudsons carried this radar. In late 1940, the more reliable Mark II entered service. Detection range was much better and by mid-1941 daytime attacks by aircraft on U-boats increased by 20 per cent. Night attacks were rendered more possible, but they were generally ineffective, since the radar had a minimum range of 1nm and in the final stage of the attack the attacking aircraft could not see its target. However, this was to be solved by the Leigh Light, a searchlight that lit up the submarines during the last seconds of the approach. In spring 1941, a modified depth charge reached service and replaced the ineffective anti-submarine bomb.

At the start of the war, the Coastal Command's most capable aircraft was the Short Sunderland flying boat patrol bomber. With its long endurance and bomb load of 2,000lb, it was a significant threat to U-boats. However, only 39 Mark I aircraft were in service in September 1939. In October 1940, 25 Sunderlands received radar. This is a Sunderland providing cover for a troop convoy which includes a battleship. (Stratford Archive)

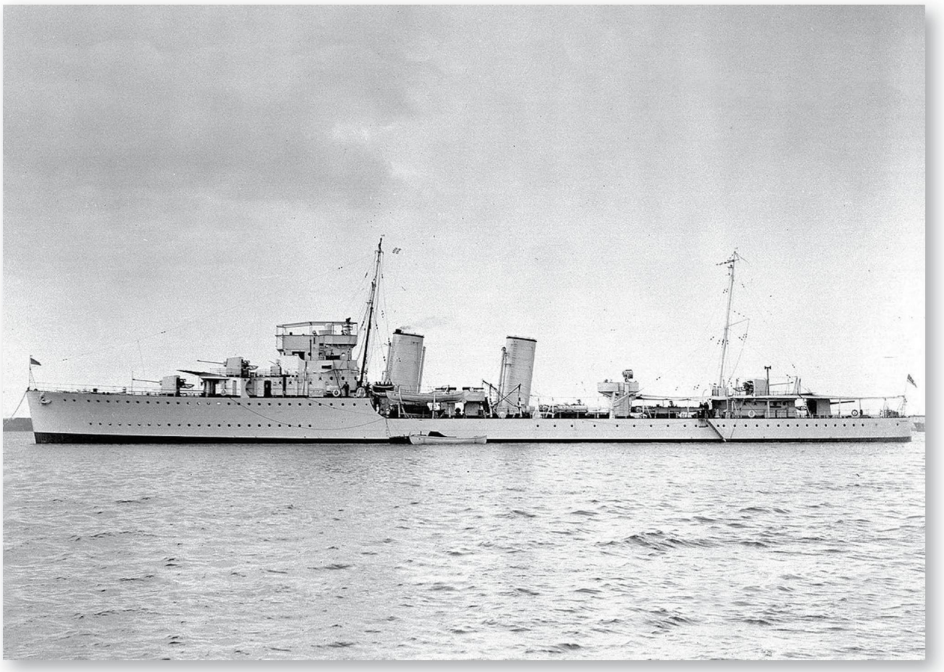
With the replacement of the Anson with the Hudson, Coastal Command effectively closed the immediate areas of the North Channel to the U-boats by October. Sunderland patrols forced the Germans even farther out from the British Isles, in turn making the problem of finding convoys much more

difficult. After the debacles of Convoys SC 7 and HX 79, Coastal Command changed its employment doctrine to flying in direct support of convoys. More than anything, it was Coastal Command's new weapons and tactics that brought the Happy Time to an end.

Losses to Allied Merchant Ships in Convoy, 1940

Convoy route	Ships in convoy	Lost in convoy	Lost as stragglers	Lost out of convoy
HX (Halifax to Britain)	3,424	48	33	24
SC (Sydney to Britain)	508	29	13	4
HG (Gibraltar to Britain)	1,718	4	5	2
OA/OB (outbound from Britain)	9,055	37	24	57
OG (Britain to Gibraltar)	2,197	6	3	0
SL (Sierra Leone to Britain)	1,502	7	14	1

For the entire year, 471 merchant ships were lost to U-boat attacks (2,186,158 GRT). In terms of ships, this was less than half the total (1,059) lost to all causes, but the majority of total tonnage lost (3,991,641). These were certainly significant losses, but they did not constitute a mortal threat to Britain's or the Allies' war efforts. To compensate for losses, production of merchant ships in British yards totalled some 1 million tons and large amounts of neutral shipping were taken over by the British during the year.



The significant role of the RCN has been long overlooked in the Atlantic campaign. One of the few Canadian ships available at the start of the war was HMCS *Saguenay*, a River-class destroyer. In October 1940, it was transferred to serve as a convoy escort on the North Atlantic run. On 1 December 1940, *Saguenay* was torpedoed west of Ireland by the Italian submarine *Argo* while escorting Convoy HG 47. This was the first RCN ship damaged during the campaign. (Canadian Naval Heritage)

At the start of the war, the RN was indecisive about whether to use escorts in submarine hunter groups or in direct convoy escorts. By the end of 1940, it was clear that convoys were effective both offensively and defensively. The bulk of U-boat losses were inflicted during their attacks on convoys, though the scale of these losses was still small. The case for the effectiveness of convoys against submarine attack was clear. Most merchant losses were incurred on ships not in convoy – of 456 merchants sunk by submarines during the year, only 102 were in convoy. Even during the Happy Time, 73 ships were sunk in convoy compared to 144 unescorted ships. Those ships in convoy simply suffered less. The critical HX convoys suffered only 2 per cent losses, HG convoys less than 1 per cent, and even the slow and vulnerable SC convoys lost just 6 per cent. Losses to outbound convoys were even less on a percentage basis.

In many ways, the Happy Time of July–October 1940 was the highwater mark for Dönitz's U-boats. The B-Dienst was operating at a high level. The absence of effective air patrols or convoy defences made it easy for the U-

boats to attack their targets. But by winter, the increased range and effectiveness of Coastal Command patrol made it difficult to detect a convoy and then mass enough U-boats for a decisive attack before the convoy came under air cover. In December 1940, only a single convoy was located and attacked by U-boats.

THE 1941 BATTLES

The first month of 1941 started with an exhibition of something close to a coordinated U-boat–Luftwaffe operation. Four boats were deployed west of the North Channel with another farther west on weather duty. With I/KG 40 and its Fw 200 Condors under Dönitz's operational control, German aircraft and submarines attempted joint operations with some degree of success. On 11 January, an outbound convoy was sighted by an Fw 200, but the U-boats were too far away to mount a concerted attack and the convoy lost only a single ship. Three days later, a U-boat sighted another outbound convoy and tried to vector in two Fw 200s without success. On 16 January, an Fw 200 detected another convoy. Though it was able to sink two ships with bombs, the U-boats were unable to attack the convoy, but they did dispatch nearby ships steaming independently. Convoy SC 19 was sighted by *U-93*, which attacked and sank three ships on 29 January. Two other boats called to the scene succeeded in sinking another ship each.

During this period, I/KG 40 recorded 15 ships sunk and three more damaged. Two other ships damaged by air attack were later sunk by submarines. The five deployed U-boats accounted for 12 ships. In one of their better performances, the three Italian submarines deployed to the west of Ireland sank a total of five ships. In total, January was a month of limited success with only 21 ships sunk by submarines in all areas for 126,782 GRT. During the month, only two convoys were attacked; the ships lost were mainly stragglers or ships from dispersed convoys. The Admiralty's Submarine Tracking Room was getting better at providing evasive routing.

From late January to mid-February, the number of boats deployed west of the North Channel was still limited. Farther to the west, Dönitz deployed another group of three Italian submarines. Although Convoy OB 279 was sighted on 3 February by *U-107*, it was only able to sink one ship in convoy and one straggler – no other boats were able to reach the convoy. Despite the lack of success against convoys, the seven deployed boats accounted for a

total of 22 ships either steaming independently or straggling from their convoys. In addition, Italian submarine *Bianchi* sank three ships and damaged another. Fw 200s sent another three ships to the bottom.

In February, a convoy (HG 53 out of Gibraltar) came under combined German surface, air and submarine attack for the first time in the war. On 8 February, *U-37* sighted the convoy west of Cape St Vincent. The next day, the submarine attacked and sank two of the convoy's 16 ships. *U-37* maintained contact with the convoy and directed five Fw 200s against it on 9 February. These attacks accounted for another five ships. *U-37* mounted a second attack on 10 February and sank another ship. Still in contact with the convoy, *U-37* was able to bring heavy cruiser *Admiral Hipper* to the scene. Since the convoy dispersed, the cruiser was only able to find and sink a single straggler. In this joint operation, the Germans accounted for nine of HG 53's 16 ships.

Back in the North Atlantic, Convoy OB 287 was sighted by an Fw 200, which proceeded to sink two ships with bombs. In response, Dönitz ordered five U-boats and three Italian submarines to attack the convoy. None of the submarines was able to find the convoy, since the coordinates provided by the aircraft were incorrect. After *U-96* sank one of the ships previously damaged by aircraft, Dönitz called the operation off on 21 February. The next outbound convoy, OB 288, was also detected by aircraft south of Iceland. Fw 200s damaged two ships and gave Dönitz the opportunity to establish a patrol line with six U-boats and two Italian submarines. *U-73* briefly held contact before the convoy changed course to the north. Three U-boats were able to find and attack the convoy on the night of 23/24 February and sank three ships. On the morning of 24 February, the convoy scattered – seven more ships were sunk, one by Italian submarine *Bianchi*.

Next to come under attack was Convoy OB 289. *U-552* first sighted the convoy south-west of Ireland on 23 February, and Dönitz ordered three more boats to converge. During the night of 23/24 February, *U-97* sank three ships and damaged a tanker. Once the convoy dispersed, four other boats sank nine further ships, two from nearby Convoy HX 109. Prien arrived in the area and sighted OB 290 on 25 February. After the attacks on the two previous convoys, the British routed it well to the south to avoid the U-boat concentration. Attacking in the early morning hours of 26 February, Prien sank two ships and damaged two more. Five other boats (two Italian) were ordered to close on the convoy, but they failed to make contact. However, *U-47*'s beacons did succeed in directing six Fw 200s to the convoy on 26

February. In its single most successful attack of the campaign, I/KG 40 sank seven ships and damaged four more. Two stragglers from OB 290 were later sunk, one by Prien and one by *Bianchi*. Total Allied merchant losses in February amounted to 39 ships of 196,783 GRT. Interestingly, this was an excellent month for the Condors, with them accounting for another 27 ships sunk.

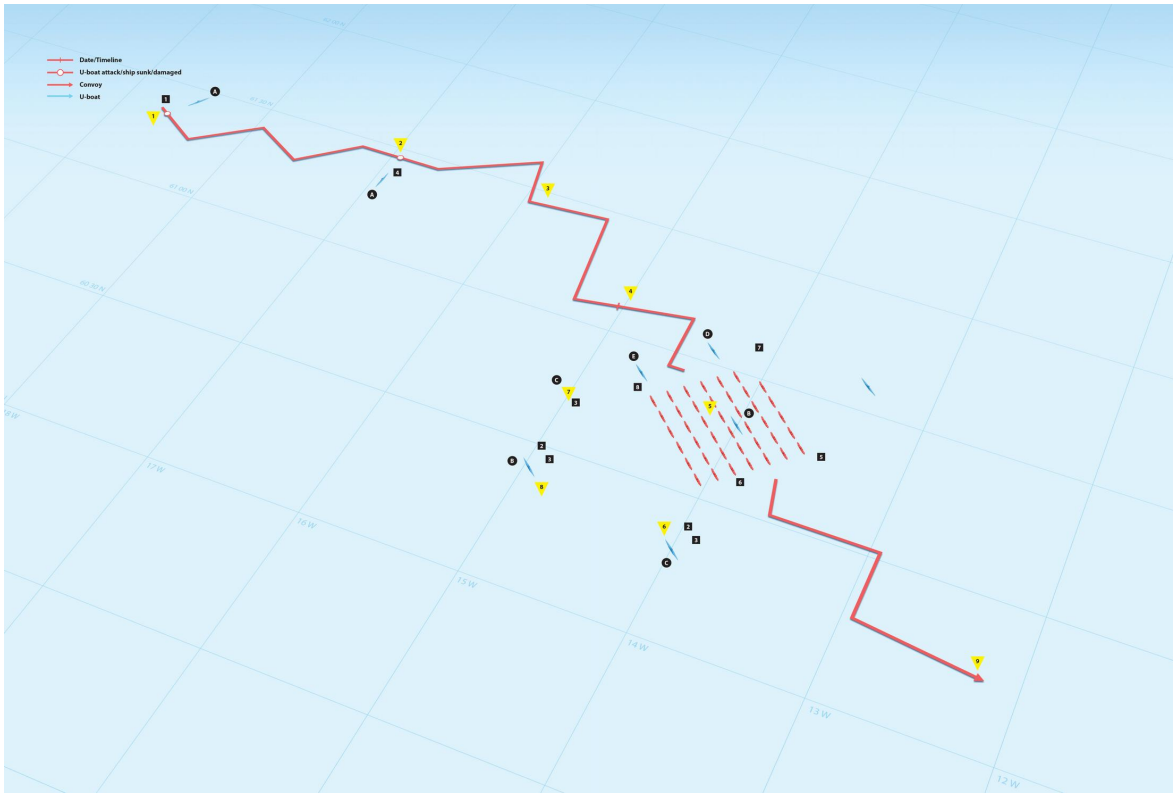
In March, Dönitz shifted his boats to the west to continue attacks against outbound convoys west of the North Channel. Convoy OB 292 was located by an Fw 200 on 2 March and lost a single ship to air attack. The British detected the presence of a line of U-boats and evaded attack by giving the convoy evasive steering orders. OB 293 was not as lucky. It was spotted on 6 March by Prien in *U-47*. Dönitz ordered four more boats to the area to form a wolfpack. The convoy's escort of three destroyers and two corvettes gave a good account of itself and turned the battle into a disaster for the U-boat force. On the night of 6/7 March, *U-70* was the first to attack and torpedoed two ships. Prien followed up with an attack by torpedoing a huge 20,000-ton whale factory ship. This was the ace's last success after 31 ships sunk. No further communication was heard from *U-47* – its loss remains unexplained. Kretschmer managed to get *U-99* inside the convoy and finished off the whale factory ship. He also dispatched one of the ships previously damaged by *U-70*. Making another attack, *U-70* torpedoed a Dutch tanker, but then it was rammed by the damaged ship. Two corvettes followed up with a depth charge attack that forced the boat to the surface where it was sunk. When *U-A* launched its attack, it torpedoed a freighter, but then it was surprised by destroyer *Wolverine* and depth charged. Though damaged, the boat was able to return to base. The final U-boat called to the scene failed to make an attack.

Further disaster befell the Germans during the next convoy encounter against HX 112. Escorting the large convoy of 41 ships was the 5th Escort Group of five destroyers and two corvettes with Commander Donald Macintyre making his first deployment as escort group commander. Lemp, now in command of *U-110*, spotted the convoy on 15 March south-east of Iceland. That night, he made two attacks but was driven off by the escorts after torpedoing a single ship. The next day, *U-37* and Schepke's *U-100* joined the battle, but they were also driven away. Kretschmer in *U-99* arrived during the night of 16 March. He boldly slipped inside the convoy on the surface and sank five ships in quick succession and damaged another. With

no torpedoes remaining, Kretschmer submerged to make his escape. *U-99* was detected by sonar and attacked by a very accurate depth charge pattern from destroyer *Walker*. The badly damaged boat was forced to the surface where Kretschmer ordered it to be scuttled. He and 39 other crewmen survived the action and were taken prisoner. When Schepke attempted to penetrate the convoy, he was detected by radar on destroyer *Vanoc*. The destroyer proceeded to ram and then depth charge *U-100*. Schepke was not among the six survivors fished out of the water by the escorts. The defence of Convoys HX 112 and OB 293, the loss of two submarine aces and the capture of a third within two weeks was a tremendous blow to the U-boat force. The first successful use of the Type 286 radar by an escort also marked an important point in the campaign.

DEATH OF THE ACES

On the night of 16/17 March 1941, a group of U-boats closed in on Convoy HX 112. German expectations of an easy victory were derailed when an experienced Royal Navy escort group conducted a series of effective counter-attacks. In a shattering blow to the U-boat arm, *U-99* and *U-100* were sunk and aces Otto Kretschmer and Joachim Schepke lost.



GERMAN FORCES

A. *U-110* (Type IXB) (Fritz-Julius Lemp)
B. *U-99* (Type VIIB) (Otto Kretschmer)
C. *U-100* (Type VIIB) (Joachim Schepke)
D. *U-37* (Type IXA) (Asmus Nicolai Clausen)
E. *U-74* (Type VIIB) (Eitel-Friedrich Kentrat)

ALLIED FORCES

1. Convoy HX 112 with 41 ships
2. HMS *Walker* (W-class destroyer)
3. HMS *Vanoc* (V-class destroyer)
4. HMS *Volunteer* (modified W-class destroyer)
5. HMS *Sardonyx* (S-class destroyer)
6. HMS *Scimitar* (S-class destroyer)
7. HMS *Bluebell* (Flower-class corvette)
8. HMS *Hydrangea* (Flower-class corvette)

EVENTS

15/16 March

1. Convoy HX 112 is sighted by ***U-110***. Four other boats (***U-99***, ***U-100***, ***U-37*** and ***U-74***) are ordered to head towards the convoy.

2. At 2230hrs, ***U-110*** torpedoes tanker ***Erodona***. The ship is abandoned and breaks in two, but the bow is towed to Iceland and is later used to rebuild the ship. Two destroyers make an unsuccessful attempt to locate the submarine. ***Volunteer*** cannot relocate the convoy and is lost in the fog.

3. The 5th Escort Group is able to prevent any further attacks.

16/17 March

4. The U-boats track the convoy on the surface and prepare for additional attacks when night falls.

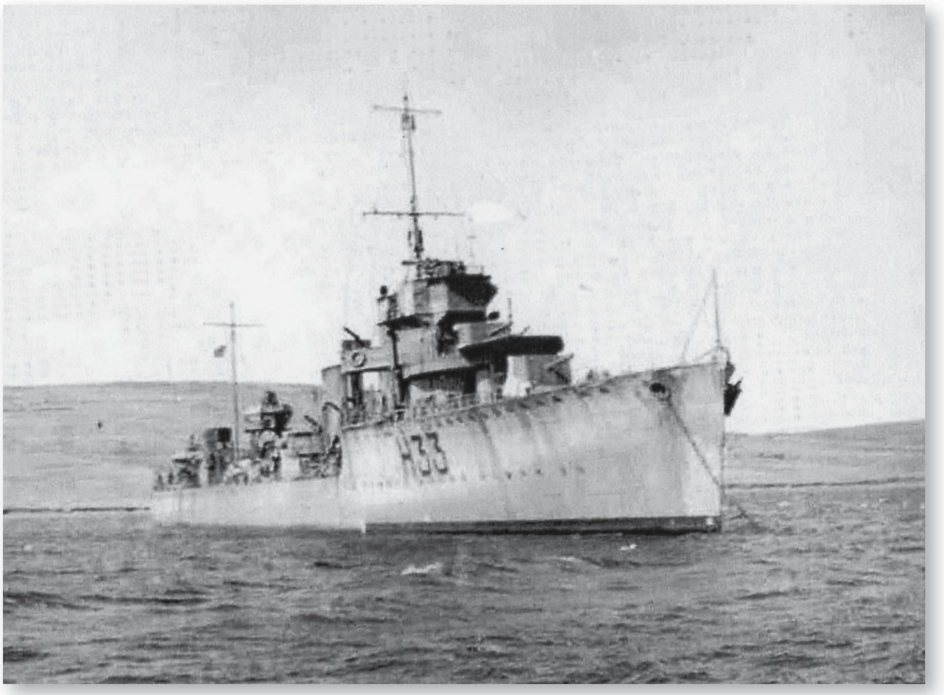
5. ***U-99*** penetrates the convoy from the north between two escorts and launches a near-perfect attack. Kretschmer sinks four ships (three tankers and a cargo ship) and damages a tanker in quick succession. After reloading, Kretschmer sinks another cargo ship. With his torpedoes expended, Kretschmer decides to withdraw.

6. At about 0048hrs on 17 March, ***Walker*** sights ***U-100*** on the surface trying to get into a position in front of the convoy. ***Walker*** attacks with ten depth charges after ***U-100*** dives. ***Vanoc*** also drops six depth charges.

7. At about 0300hrs, ***U-100*** surfaces and is spotted by destroyer ***Vanoc***. The destroyer rams ***U-100***; Schepke is killed on his bridge and the submarine goes down taking 38 of the 44 crewmen.

8. At 0337hrs***, U-99*** nearly collides with a destroyer while making its escape. Kretschmer dives his boat but is picked up by sonar on ***Walker***. The destroyer launches a depth-charge attack and inflicts severe damage on ***U-99***. Kretschmer is forced to surface and comes under fire from the two destroyers. Kretschmer and 39 of his crew are pulled from the water by the British.

9 No further attacks are launched on Convoy HX 112.



HMS *Vanoc*, a V-class destroyer commissioned in 1917, is shown here in its original World War II configuration. As part of the 5th Escort Group, it played a major role during the defence of Convoy HX 112 in March 1941 when two U-boats were sunk in exchange for the loss of five merchant ships. (Stratford Archive)

For the remainder of March, the Germans were unsuccessful in massing against a convoy. At the end of the month, six boats operated west of the North Channel. Although they had the assistance of I/KG 40, Dönitz was not able to mass more than two boats against a convoy. Nevertheless, several boats sank between two and five ships during the period, primarily against ships steaming independently. For the month, total losses came to 41 ships of 243,020 GRT.

OPERATIONS IN THE SOUTH ATLANTIC

Dönitz understood from his previous foray into the South Atlantic that the area was lightly defended. To stretch British defences even further, he planned the first wolfpack operation in the Freetown area. Three boats were selected – *U-105*, *U-106* and *U-124*, all Type IXBs. On their southward transit, all three refuelled from a German tanker in Las Palmas in the Canary Islands.

Dönitz ordered *U-105* and *U-124* to support battleships *Gneisenau* and *Scharnhorst*, which had spotted Convoy SL 67 north-east of the Cape Verde Islands. The convoy was escorted by battleship *Malaya*, which was enough to deter the German capital ships. On the night of 7/8 March, the submarines attacked and sank five ships, but they failed to sight the battleship.

Convoy SL 68 was sighted by *U-106* east of the Cape Verde Islands on 15 March, and called in *U-105*. Over the course of the next seven days, *U-105* sank five ships and *U-106* two, while also damaging *Malaya*. The single torpedo hit forced the battleship into repairs in the United States for four months. Meanwhile, *U-124* operated for four weeks off Freetown, during which time it sank seven ships before departing on 20 April after expending all its torpedoes.

U-105 and *U-106* remained on station after refuelling from supply ships and were joined by a second wave of five U-boats and two Italian submarines. By the time they had concluded their deployments, *U-105* had sunk 12 ships (71,450 GRT) and *U-106* eight (plus damaging *Malaya*). Four of the U-boats in the second wave had also scored heavily. Foremost was *U-107* under Günter Hessler (Dönitz's son-in-law, and he made Hessler a U-boat commander although he had never served on a submarine), which sank 14 ships (86,699 GRT), marking this as the most successful patrol by a U-boat during the entire war. In addition, *U-103* sank 12 ships, *U-38* eight and *U-69* another five. The second-wave group was forced to curtail its deployment after the supply ships were sunk by British forces.

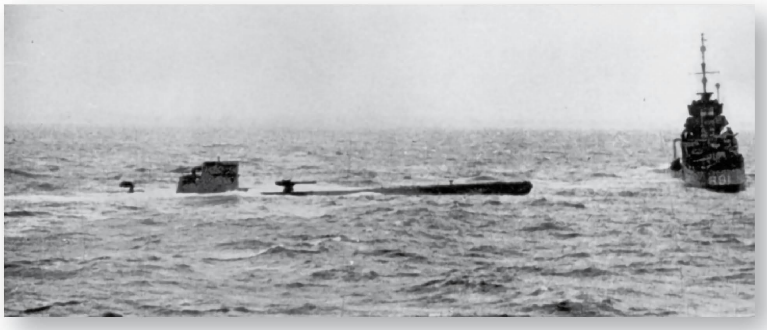
One of the returning boats, *U-69*, was joined by two of the first-wave boats, *U-66* and *U-123*, and mounted a series of attacks against Convoy SL 78 west of the Canary Islands beginning on 27 June. In total, eight ships were sunk.

LULL IN THE NORTH ATLANTIC

Few convoys in the North Atlantic were attacked or even detected during April. Operations by Fw 200s continued but failed to produce results. Late in the month, Convoy HX 121 was sighted by a U-boat west of the North Channel and Dönitz ordered five more boats into position to attack. Four boats made contact, but they managed to sink just four ships. In exchange, *U-65* was sunk by the destroyer *Douglas*. Eleven boats recorded the sinking of 14 ships in the North Atlantic during the period. However, when the

successes of all boats from all areas are added up, Allied merchant losses rose to 43 ships of 249,375 GRT.

In the first half of May, Dönitz's attempts to attack convoys in the North Atlantic met with more frustration. The WAC began to route convoys farther to the north to benefit from the protection of escorts and aircraft operating from Iceland. After three unsuccessful attempts to attack a convoy, Dönitz changed tactics. Aggressive patrolling by Coastal Command made operations in the Eastern Atlantic east of 20 degrees west longitude untenable. On 8 May, he ordered his boats more to the south-west of Iceland, sent the Italian boats to their own operational area away from the U-boats and stopped direct coordinated operations with I/KG 40. Several convoys were spotted on 7–8 May, but all were well defended. Convoy OB 318 was attacked by *U-94* south of Iceland and two ships were lost, but the 3rd Escort Group damaged the offender. The following day, parts of the same escort group reinforced the escorts of HX 123. On the night of 8 May, Lemp on *U-110* spotted the convoy and launched an attack that sank two ships. However, corvette *Aubrietia* forced Lemp's boat to the surface with a well-placed depth charge barrage. Once on the surface, the boat was subjected to a barrage of gunfire that killed Lemp. As the remaining crewmen slipped into the sea, a boarding party from destroyer *Bulldog* seized the boat with its Enigma machine and code materials. *Bulldog* took *U-110* in tow, but it sank on 11 May on the way to Iceland. Convoy HX 123 was subjected to additional attacks that sank four more ships and damaged another. In exchange, another U-boat was damaged by depth charges.



On its second patrol, Type IXB boat *U-110* was part of the pack converging on Convoy OB 318. After sinking two ships, escorts depth charged *U-110* and forced it to the surface. The crew abandoned ship before ensuring that the boat was going to sink. This incredible

oversight gave a boarding party from the destroyer *Bulldog* the opportunity to strip the boat of a treasure trove of cryptologic material. (Royal Navy, now in the public domain)

Dönitz formed eight boats into the 'West' group and deployed south-south-east of Cape Farewell in southern Greenland in mid-May. On 19 May, one of the boats, *U-94*, spotted Convoy HX 126, launched its attack and sank two ships. The next day, two more ships were sunk by *U-556*. The other West boats also found the convoy, but they were unable to inflict further damage; one of them was damaged by depth charges from an escort. During the course of its transit, 33 merchant ships were part of HX 126. Twelve of these were sunk while it was unescorted in the initial part of its transit or after it dispersed after reaching coastal waters near Britain. For the British, this was another debacle and prompted the institution of continuous anti-submarine coverage for North Atlantic convoys. On 25 May, the same boats were formed into a patrol line in support of the battleship *Bismarck*. The effort was unsuccessful, and the battleship was sunk by British forces on 27 May. In May, merchant losses to Axis submarines rose to 58 ships of 325,492 GRT. However, more than half of these were lost around Freetown as a result of Dönitz's efforts to open a new front in the South Atlantic.

As Allied shipping losses remained high during May, Dönitz lacked the insight to understand that the Germans were losing the Atlantic campaign. British evasive routing of convoys made it increasingly hard for the U-boats to find them. In May, only a single convoy was attacked (HX 126) and it was located at 41 degrees west longitude, south of Greenland – the farthest point to the west a convoy had been attacked. The Germans were being pushed farther and farther out into the Atlantic. Other than the success against HX 126, convoy attacks were mounted by single U-boats that stumbled onto a convoy. HX 126 was the last convoy to undergo a significant attack for three months. Another factor that limited Dönitz's prospects was when, on 18 June, the British changed the top speed of ships required to convoy from 13 to 15 kts. This had the effect of limiting the number of ships steaming independently; losses of such ships went from an average of 35 per month to just 12.

By the start of June, Dönitz formed another West group of six boats. Ten more boats joined West by 20 June. Despite this large concentration, no convoys were found or attacked. However, the Germans continued to feast on ships steaming independently. Eleven boats sank 27 such ships during the

month. However, the lack of overall success prompted Dönitz to assess that the British were successfully re-routing convoys, so he broke the West group up to cover the Central Atlantic. *U-203* detected Convoy HX 133 south of Greenland on 23 June. That night, the U-boat sank one ship before it lost contact with the convoy. The next day, the same boat sighted Convoy OB 336 headed west. The boat attacked this new target and sank another ship. Four more boats were ordered to attack OB 336, but they were only able to sink two additional ships. Six more boats shadowed the convoy but failed to launch attacks. HX 133 came under attack again beginning on 26 June from three more boats; one managed to sink two ships, but three Flower-class corvettes sank another U-boat to the east of the convoy. The battle continued on 29 June when *U-651* sank another ship, but in turn it was sunk by five escorts. Although Convoy HX 133 was spotted later in the day by an Fw 200, no further submarine attacks were possible. This convoy battle demonstrated the growing power of the escorts. Dönitz committed a total of ten boats against the convoy. Initially, it was protected by four escorts. The WAC reinforced the escort with two more escort groups until 13 escorts were involved in defence of the convoy. In total, this convoy battle cost the British 11 ships (57,215 GRT) in exchange for two U-boats.

Beginning its career as *U-570*, and ending it as HMS *Graph*, this was the only U-boat to see active service on both sides in the Atlantic campaign. The Type VIIC boat was captured on 27 August 1941 when the inexperienced captain and crew surrendered to a Hudson bomber. In RN service, as in this view, it conducted three patrols before being relegated to training duties. (Naval History and Heritage Command)

Allied efforts in the Atlantic were beginning to pay off. In spite of the greater number of U-boats at sea, shipping losses dropped. In the Atlantic, 22 ships of 94,209 GRT were lost in July and 23 ships of 80,310 GRT in August. Not until September did another major attack occur on an Atlantic convoy.

Dönitz reacted to the new situation in July by concentrating 15 boats in the waters between Ireland and Iceland. Despite I/KG 40 reporting a convoy, two patrol lines were unsuccessful in finding any convoys. This failure was largely due to the efforts of Coastal Command, which was patrolling the entire area. During August, 18 attacks were recorded by aircraft against U-boats.

Over the next three months, only four convoys were attacked in the North Atlantic. In August, Dönitz massed 20 boats south-west of Iceland. Now able to decode U-boat traffic in only a few hours, the Submarine Tracking Room possessed an unprecedented level of insight into U-boat dispositions. On 22 August, six convoys were diverted to the north. As a result, none was attacked. During the course of German attempts to attack Convoy HX 145, a Coastal Command Hudson attacked and damaged *U-570* on 27 August. Chlorine gas from battery acid mixed with seawater panicked the inexperienced crew and the boat's equally inexperienced commander surrendered to the bomber circling overhead. The following day, after numerous RN escorts arrived on the scene, they took off the crew, and towed the boat to Iceland. It later entered RN service as HMS *Graph*.

In late August, Dönitz assembled a pack of 14 boats south-west of Iceland. The *Markgraf* pack was foiled by the Submarine Tracking Room's continuing excellence in diverting convoys out of harm's way. On 1 September, the five convoys in the danger area were all routed to the north to avoid attack. On 6 September, Dönitz changed tactics and ordered Markgraf to cover a wider area. The British decoded these orders and ordered the two nearest convoys to the south to avoid attack. Heavy weather in the area made this impossible, so the convoys were instead directed to hug the coast of Greenland. Convoy SC 42, escorted by the RCN's 24th Escort Group with one destroyer and three corvettes, was spotted by a U-boat on 9 September near Cape Farewell.

SC 42 was a typical North Atlantic convoy of the period, and its fate is illustrative. It departed Sydney, Cape Breton Island, on 30 August with 64 merchants escorted by an RCN group of one destroyer and three corvettes. It took a northerly route and on 6 August was near Cape Farewell in Greenland. At this point, the Submarine Tracking Room determined that a U-boat pack was gathering to attack, so the convoy was ordered to head even farther north to hug the coast of Greenland. The first U-boat was spotted on the morning of 9 September by a straggler just astern of the convoy. That evening, the convoy made an evasive manoeuvre, but the massive amount of smoke from the merchants, visible for 30nm, had already brought U-boats to the scene. Escort Group 24 received another two corvettes as reinforcements, but the odds were in favour of the Germans, with a dozen U-boats facing five largely untrained Canadian corvettes and a destroyer, all without radar. At 2130hrs, the attacks began, and the first ships went down. Between dusk and midnight, seven more ships were sunk, some by U-boats attacking from within the convoy. Of the 17 U-boats Dönitz sent toward the convoy, at least eight attacked the convoy during the night. Two more ships were lost later in the night. The outnumbered escorts were unable to defend the convoy. The destroyer detected and tried to engage a surfaced U-boat amid the columns of the convoy with no luck, and later three more escorts gained contact on a submerged U-boat and began an attack. The U-boat survived, since the escorts could not leave the convoy unprotected to mount a sustained attack. The next night, the attacks resumed, and five more ships went down. The escort was reinforced with two more corvettes, which accounted for *U-501*. The carnage looked ready to resume on the night of 11 September, even after a fresh escort group with five ships arrived from Iceland and sank *U-207*. Only the arrival of heavy fog around the convoy prevented another night of death and destruction.

The fate of Convoy SC 42 showed that if the Germans were allowed to mass on a convoy, even a well defended one, the results were deadly. In total, SC 42 suffered 16 ships lost and a tanker damaged. In exchange, two U-boats were lost.

During the period when SC 42 suffered heavy losses, two other wolfpacks formed on 1 September met with only frustration. The packs were formed west and south-west of Iceland; despite occasional sightings from U-boats and aircraft, Dönitz was unable to mass his boats against a convoy even when

the two packs were formed into one to pursue OG 73, which had been sighted on three occasions.

ACTION IN THE CENTRAL ATLANTIC

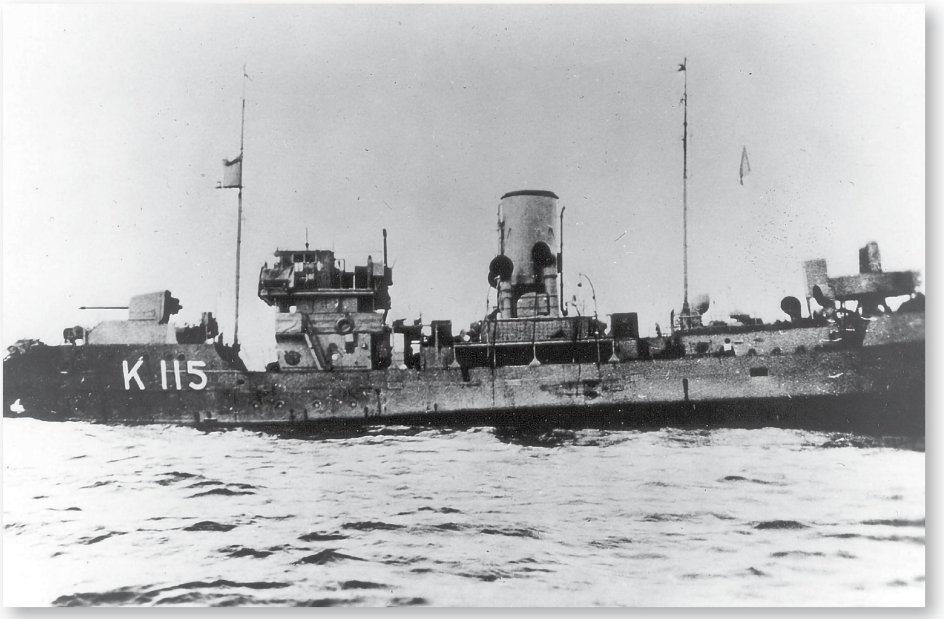
With the British successfully diverting convoys around the mass of U-boats south of Iceland, much of the action during the summer of 1941 shifted to the south against the Britain–Gibraltar route. Here the Germans had better cueing information on convoy movements. Using B-Dienst information, reports from Axis agents watching Gibraltar and reconnaissance information from I/KG 40, the Germans were able to mass on several convoys. B-Dienst gained information on the location of Convoys OG 69 and SL 80 on 24 July. Fourteen U-boats were sent to attack them, supported by Condors, which gained contact on both the next day. Contact on Convoy SL 80 could not be maintained, but Dönitz was able to bring seven U-boats and three Italian boats against OG 69 beginning on 26 July. Over the next three days, seven ships were sunk for no Axis losses.

In early August, Convoy SL 81 was tracked by B-Dienst and then detected by a U-boat west of Ireland. By 3 August, ten U-boats had gathered around the convoy. Despite the presence of a strong escort (three destroyers, eight corvettes and a CAM [catapult aircraft merchant] ship), the Germans inflicted heavy losses. The opening round on 3 August went well for the escort, with a Hurricane fighter from the CAM shooting down a Condor and the escort sinking a U-boat and protecting the convoy from attack that night. The next day developed in favour of the Germans with two Condors sinking one merchant and that night four U-boats sank five more merchants after getting inside the convoy.

Convoys HG 68 and HG 69 got through unscathed, but on 17 August, OG 71 was detected by a Condor west of Ireland. Dönitz sent eight boats toward the convoy and on the night of 18/19 August, three of them were able to launch attacks and sink a Norwegian escort and three merchants. The 5th Escort Group drove off the nearby boats on 19 August and was reinforced by three destroyers over the next two days. With the aid of a Condor report, the U-boats were able to resume attacks on 22 August. This time, a British corvette and five more ships were sunk. For a loss of ten ships and two escorts, the British were unable to sink a single U-boat.

Primary convoy routes
Merchant ships sunk
U-boats sunk
Allied air cover
Primary naval bases
Primary U-boat bases
N
40° W
20° W
0°
GREENLAND
ICELAND
Denmark Strait
Norwegian Sea
Reykjavik
Faroe Islands
Trondheim
NORWAY
Shetland Islands
Bergen
60° N
Cape Farewell
Orkney Islands
Labrador Sea
North Sea
Derry
GREAT BRITAIN
Belfast
Liverpool
IRELAND
London
CANADA
Plymouth
Portsmouth
Paris
Gulf of St Lawrence
Newfoundland
Brest
Lorient
FRANCE
St John's
St Nazaire
Sydney
La Rochelle
BAY OF BISCAY
Halifax
Bordeaux
40° N
NORTH ATLANTIC OCEAN
Azores
Gibraltar
Bermuda
Madeira
Canary Islands
20° N
American Neutrality Patrol Zone
Cape Verde Islands
SIERRA LEONE
Freetown
0
750nm
0
750km

Merchant and U-boat losses, April–December 1941



Flower-class corvette HMCS *Lévis* was laid down in a Canadian shipyard and commissioned into RCN service in May 1941. The following month it joined the Newfoundland Escort Force. On 19 September, as part of the 19th Escort Group escorting convoy SC 44, it was torpedoed by *U-74* east of Cape Farewell, Greenland. The corvette foundered the following day, becoming the first Canadian Flower-class corvette to be sunk. (Canadian Naval Heritage)

GERMAN SUCCESS IN THE NORTH ATLANTIC

After months of frustration, in September, Dönitz's efforts in the North Atlantic paid off. In total during that month, Allied shipping losses rose again, this time to 53 ships of 202,820 GRT. This was primarily the result of attacks on four convoys. Two of these were slow convoys headed for Britain. Both were located south of Greenland giving Dönitz time to mass on them.

The fate of Convoy SC 42 has already been described (see **page 80 onwards**). SC 44 was also escorted by an RCN escort group. On 20 September, for the first time, American destroyers were dispatched to reinforce a convoy when it came under attack. However, they arrived too late to make a difference. Convoy SC 44 came under attack from five U-boats east of Cape Farewell; four ships and a corvette were sunk, with no German

losses. A total of 20 merchants and an escort were lost in the two convoys. In return, only two U-boats were sunk.

The other two convoys heavily attacked during the month were SL 87 and HG 73. Convoy SL 87 was composed of 11 merchants and four escorts. Seven merchants were sunk. HG 73 was spotted by an Fw 200 off Cape St Vincent and Dönitz was able to assemble a pack of U-boats. Convoys steaming from Gibraltar were especially vulnerable to detection from the air and to air attack, since the I/KG 40's base at Bordeaux was so close and the convoy route was in range for its entire time. HG convoys enjoyed no air cover.

THE MEDITERRANEAN WESTERN APPROACHES DIVERSION

Beginning in September 1941, the situation in the Mediterranean prompted Hitler to order submarines from the Atlantic into the area. The first group of six boats entered the Mediterranean successfully in late September and early October. A second group of four boats followed on 11 November, but only three boats survived the passage. A third group of five boats passed through the Strait of Gibraltar during the last part of November. During December, 17 U-boats attempted the passage, but two were sunk and four were severely damaged and returned to France. These submarines fared poorly as the British had ascertained the redeployment and had reinforced patrols in the area. In addition to the boats sent into the Mediterranean, more boats were deployed in the approaches west of Gibraltar to attack reinforcements from Britain that the Germans expected to pass through the area.

The concentration of U-boats in the Western Approaches to Gibraltar led to several major convoy battles. Since the area was often subjected to Fw 200 attack, the British deployed their first auxiliary carrier (later known as escort carriers) to counter the threat and strengthen the escort. Named *Audacity*, the ship was a captured German merchant which was converted to hold a flight deck that could carry six fighters. While escorting Convoy OG 74, its fighters shot down a Condor when the convoy came under attack on 20–21 September. OG 74 was under the protection of Commander Walker's 36th Escort Group. Only two ships were sunk by U-boats on the night of 20

September before they were driven off by Walker's group. Three more stragglers were sunk.

HMS *Audacity* was the first RN escort carrier to see action in the Atlantic campaign. To get aircraft to sea, the Admiralty decided to convert several merchant ships into auxiliary carriers. *Audacity* was a basic conversion of the captured German cargo ship *Hannover*. The new carrier was commissioned on 17 June 1941; it could carry six fighters. Assigned to escort convoys coming to and from Gibraltar, it was sunk on its fourth mission on 14 December 1941. (Naval History and Heritage Command)

On 23 September, Dönitz shifted his boats to attack Convoy HG 73. Despite the very strong escort of one destroyer, two sloops, eight corvettes and a CAM ship, the Germans again scored heavily. Nine ships were sunk over the course of 25/26 September in a series of night attacks. Again, no U-boats were sunk. In October, Convoy OG 75 was spotted by Condors but was not attacked and HG 75 lost only four ships after Dönitz made a major effort to attack it.

The Admiralty held back the next convoy until a much stronger escort could be assembled. The next convoy, HG 76 with 32 ships, was protected by the 36th Escort Group under Commander Walker. His strengthened Escort Group included three destroyers, two sloops, seven corvettes and *Audacity*. On 14 December, the convoy of 32 ships departed Gibraltar. The battle opened the next day when an Australian destroyer sank *U-127*. On 16 December, the convoy was detected by an Fw 200 – Dönitz now had the information he needed to order the *Seeräuber* wolfpack of five U-boats, reinforced by five more, to converge on the convoy.

In a pitched battle over four days and nights, German aircraft and submarines attacked the convoy. Four more U-boats were destroyed – *U-131* to surface escorts and fighters from *Audacity*, and *U-434*, *U-574* and *U-567* to escorts (with Walker's flagship, the sloop *Stork*, accounting for *U-574*). Two Condors were lost to fighter attack. In return, the British also suffered heavily. Only two merchants were sunk, but a destroyer was sunk by torpedoes, and *Stork* was damaged when it rammed *U-574*. Dönitz ordered his U-boats to prioritize the destruction of the carrier, and on 21 September, it was dispatched by torpedoes from *U-751*. The ferocity of the convoy's defence and the scale of its losses forced Dönitz to break off the action on 23 September. In the first convoy action of the war against a convoy defended by an aircraft carrier, the U-boats were badly beaten.

Dönitz's shift to the Mediterranean and its Western Approaches had a dramatic impact on the Atlantic campaign. Already in October, losses to U-boats fell to 32 ships of 156,554 GRT as the boats made their way south into the Mediterranean. One of the few convoys attacked that month was SC 48, which was routed through the North Atlantic under heavy escort and then reinforced by five RN and USN destroyers and another RN corvette. Beginning on 17 October, three ships were lost before the reinforcements arrived, and another six after their arrival. USN destroyer *Kearney* was torpedoed and damaged in this battle, but was towed to Iceland and survived. This was the first USN ship damaged by enemy action in the war.

In the middle of the month, Dönitz formed the *Breslau* pack with six German and three Italian boats. One of these detected HG 75 on 23 October. That night, two of the German boats were able to launch attacks, sinking three ships and an escorting destroyer. Subsequent attacks against the convoy were unsuccessful.

Although the focus of U-boat operations shifted to the Mediterranean approaches, Dönitz tried to maintain pressure in the North Atlantic. After the successful operation against Convoy SC 48, Dönitz formed seven boats into pack *Reissewolf* and nine more into *Schlagetot*. Both were deployed west of Ireland but achieved little. Convoy SL 89 was spotted by a U-boat on 20 October and the convoy lost three ships to submarine attack the following day. By 23 October, the escort had driven away the submarines near the convoy. Reissewolf was unable to achieve anything else when the Submarine Tracking Room diverted convoys around the pack. On 27 October, one Reissewolf boat spotted ON 28 and the pack was ordered to converge.

Between 28 and 30 October, five boats tried to attack the convoy, but they were driven off by the five escorting USN destroyers after damaging a USN oiler. The next convoys, HX 156 and SC 51, were rerouted to the south to avoid Reissewolf. Convoy ON 30 was also sent to the south after being handed over to a USN escort and avoided attack.

Watch officers aboard an escort keep watch for U-boats in this scene from October 1941. Without radar, visual observation was the only method to locate incoming threats. At night, with decks awash, even a surfaced boat was very difficult to spot. (Royal Navy, now in the public domain)

During the last two months of the year, U-boat activity was greatly reduced as the full impact of the redeployment of German submarines to the Mediterranean took effect. In November, a mere 13 ships of 62,196 GRT were lost. One of the few convoys that came under attack was SC 52, detected south of Cape Race, Newfoundland. This was the farthest point west that a convoy had been detected. So fearful was the Admiralty that the RCN escort group could not provide adequate protection for the slow convoy, it was sent back to Nova Scotia – the only time during the war when a convoy was sent back by the threat of German attack. On their way back, four ships were sunk by U-boats and another two were lost due to grounding.

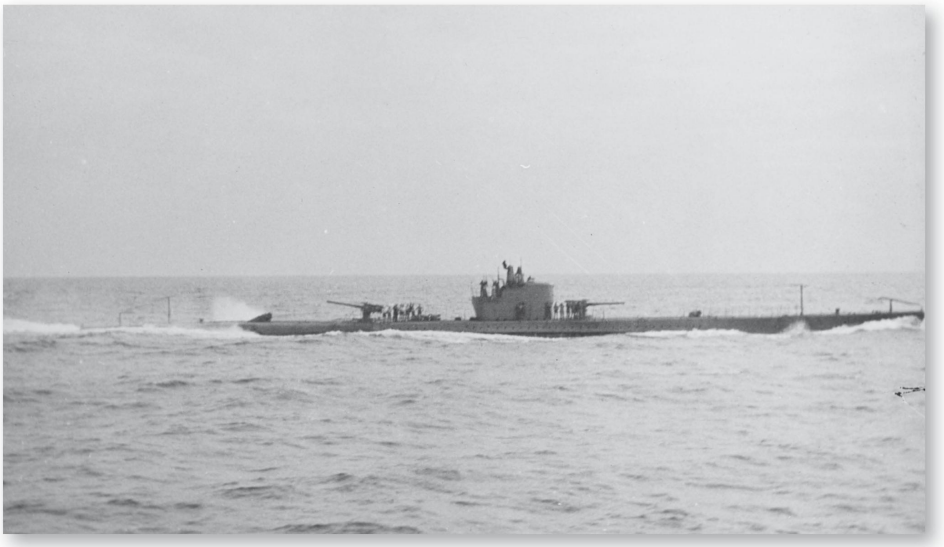
In December, convoys were running through the North Atlantic almost undisturbed. At one point, only three boats were on patrol in the rough waters of the North Atlantic. Only by chance, *U-130* encountered SC 57 on 10

December and sank three ships. This was the only success during the month against a North Atlantic convoy. In December, only nine ships were sunk in the Atlantic of 45,931 GRT, though total losses to U-boats in all areas were 26 ships of 124,070 GRT. During the last month of 1941, 28 U-boats were either in the Mediterranean or earmarked for transfer there. By 8 December, only 27 boats were available for the entire Atlantic.

Due to a lack of resources, Dönitz was unable to keep the pressure up in the South Atlantic. In May, 30 Allied ships were sunk in the area. For several reasons, losses dropped dramatically; in June only five ships were sunk, in the next two months only two and in September none. In the final three months of the year, only six ships were lost. This was due to Dönitz sending fewer boats to the area, and this was reduced by successful British efforts to sink German supply ships used to support U-boats in these distant waters. In addition, whenever possible, merchant ships were routed out of the areas off the West African coast and air and escort patrols in the area were strengthened.

THE ITALIAN CONNECTION

Italy entered the war in June 1940 on the side of the Axis. At the start of the war, the Italian Navy boasted a total of 115 submarines of which 84 were operational. Most were suited only for operations in the Mediterranean, but a large number were capable of open ocean operations in the Atlantic. Italian submarines were inferior to German units and Italian submarine captains were less aggressive than their German counterparts. In a portent of things to come, between 5 June and 13 July, two Italian submarines departed the Mediterranean and operated in the Central Atlantic. Neither boat recorded any success before returning to their base in the Mediterranean.



Although less aggressively handled then their German counterparts, Italian submarines played an important though forgotten role in the Atlantic campaign. Those sent to the Atlantic were larger than their German counterparts. This is the Calvi-class submarine *Giuseppe Finzi* seen from an American merchant ship on 20 July 1941. This was one of the more successful Italian boats, sinking five merchant ships in its nine patrols. (Naval History and Heritage Command)

On 24 July, the Italians offered to assist the Germans in attacking British commerce in the Atlantic. Dönitz accepted the offer and Bordeaux was offered to the Italians as a base (later codenamed BETASOM by the Italians). An Italian officer joined Dönitz's staff to coordinate operations. By November, 26 submarines were assigned to BETASOM, with the eventual total reaching 28 Italian submarines from the Mediterranean and four from the Italian Red Sea Flotilla based in Massawa, Eritrea. The addition of 32 submarines appeared to hold great potential in a period when Dönitz was struggling with an inadequate number of U-boats.

The initial groups of Italian submarines departed the Mediterranean, operated near the Azores and then proceeded to Bordeaux. Dönitz's first idea for the Italians was to use them in coordination with his own U-boats. The first effort at joint operations was made in October–November 1940 when Dönitz sent the Italian boats to operating areas to the west and south-west of the German boats off the North Channel. Dönitz placed the Italians out of British air range and in a position where he hoped they could provide detection of approaching convoys. This coordinated operation ended in failure; the Italians did not find any new convoys nor did they attack the

convoys previously located by the Germans. Accordingly, on 5 December, Dönitz called off the operation and redeployed the Italians to look for individual merchant ships south and west of the German patrol areas.

On 18 February 1941, Dönitz mounted another attempt at coordinated operations with the Italians. He deployed the Italian boats to extend the area of coverage south of Iceland. By 5 May, Dönitz recognized that this attempt was also a failure. From this point, the Italians were only assigned independent operations during which they enjoyed some success. On 26 May, seven Italian boats were deployed west of Gibraltar to attack convoys. Against Convoy OG 63, two Italian submarines sank two merchant ships on 5 and 6 June. The Italians claimed other hits, but no additional ships were hit. On 12 June, an Italian submarine spotted Convoy SL 76 east of the Azores. In an attack the following day, *Brin* sank two ships.

By any measure, Italian submarines operating in the Atlantic were less effective than German ones. After an uncertain start, the performance of the Italians improved in 1941 when younger captains were assigned to the Italian boats, German training was provided to Italian crews and technical refinements, including the reduction of the large sails on Italian boats, were undertaken. The Italians gradually became more familiar with the harsh operating conditions in the Atlantic. When losses of Italian submarines in the Mediterranean increased, 11 BETASOM boats returned to the Mediterranean. Despite these difficulties, BETASOM boats accounted for 109 Allied merchants (593,864 GRT) before the last seven Italian boats at Bordeaux were converted into transports in 1943.

THE SITUATION AT THE END OF 1941

From the end of the Happy Time until the end of 1941, Britain's fortunes in the Atlantic improved. Merchant losses were still heavy, but they were not sufficient to threaten Britain's merchant lifelines. From 1 April until the end of the year, shipping losses to Axis submarines amounted to 328 ships of 1,576,000 GRT. Of these, 206 ships were not sailing in convoy. Losses were dramatically reduced by evasive routing of convoys in the North Atlantic throughout the period, and in the South Atlantic during the last months of 1941. Evasive routing using intelligence derived from Ultra probably prevented the destruction of at least 300 ships alone in 1941.

In convoy encounters, the better trained and organized escorts were beginning to exact a growing toll on U-boats. The ratio of losses of merchants lost in convoy to U-boats destroyed was approximately 6:1, a rate that Dönitz could not afford. Where available, aircraft made a huge difference in the battle against the U-boats. Within 400nm of a Coastal Command base, U-boat operations were limited and therefore shipping losses rare. Between 400nm to 600nm from a Coastal Command base, fewer aircraft had the range to operate and merchant losses were correspondingly higher. Beyond 600nm, the U-boats did not have to worry about British aircraft – this is where the Germans increasingly concentrated their operations and where merchant losses were the heaviest.

German losses in 1941 totalled 28 U-boats, and of these 20 were lost at the hands of convoy escorts. New construction surpassed losses, so by the end of 1941, the force was up to 86 operational boats with another 150 involved in training or on trials. Allocation of the available operational boats was driven by other considerations besides the best way to implement Dönitz's tonnage war. During the last half of 1941, the Mediterranean theatre absorbed a huge part of the operational U-boat force – 15 were moved into the Mediterranean with another 35 allocated to move there or to be stationed in the Western Approaches to Gibraltar to cut off reinforcements the Germans believed were headed into the Mediterranean. This left a mere 36 boats for operations in the rest of the Atlantic. To make matters worse, in December, Dönitz was ordered to send six boats to patrol off Norway in response to Hitler's fears that the British were about to invade.

For Dönitz, the number of boats at sea was gradually increasing. The average number of boats at sea was 24 in May, rising to 36 in August, and then to 38 in November. From July to October 1941, the overall number of operational U-boats rose from 65 to 80. Production also ramped up over this period and averaged almost 18 boats per month. However, in terms of effectiveness, U-boats were dramatically decreasing. The average tonnage sunk daily by a U-boat in November 1941 was 66. This compared poorly with the wartime peak of 976 recorded in October 1940.

Through a combination of German submarine deployments to the Mediterranean and the focus on attacking convoys to and from Gibraltar, Dönitz was forced to virtually abandon the North Atlantic in late autumn 1941 until the end of the year. Dönitz's strategy of expanding the tonnage war was minimally effective, again due to expanded British defences and evasive

routing. At the end of the year, the focus was on attacking convoys to and from Gibraltar, but this lacked the prospect of inflicting heavy losses on Allied shipping.

Probably the most important event of World War II was the Japanese attack on the USN's Pacific Fleet in Pearl Harbor. As a result, the US entered the war, and the nature of the entire war was transformed. This included the Atlantic campaign where the U-boats now faced the combined strength of the RN and much of the USN. The United States's entry into the war also presented a huge opportunity to Dönitz, and it was not one he missed. Twelve U-boats were preparing to mount an offensive off the east coast of the US. The disaster that followed was arguably a greater defeat than that of Pearl Harbor.

AFTERMATH

The first six months of the Atlantic campaign were only a skirmish. Following the Norwegian campaign, the Germans again turned their attention to cutting off British trade. In June 1940, France surrendered. This changed the entire complexion of the campaign as the U-boats then had bases from Norway down through France. This gave the Germans a series of naval and air bases which directly threatened Britain. From the spring of 1940 until the spring of 1941, Britain was under the greatest threat of a German blockade.

However, the Germans lacked the plans and the assets to take advantage of this situation. Instead of mounting pointless terror raids against British cities, a concerted campaign against British ports would have been more impactful. In terms of naval resources, the Germans lacked the means to launch crippling attacks against British shipping. German surface raiders were not numerous enough to provide decisive results, and the operations of the Kriegsmarine's heavy surface units, though spectacular when used against shipping, amounted to little more than pinpricks.

Had the Germans given the highest priority to U-boat construction at the outset of war, decisive results might have been possible. Instead, this priority was only assigned in July 1940, which meant that new boats did not arrive in greater numbers until the middle of 1941. It also meant that the British had almost a full year to ramp up escort production. The delay in the increase of U-boat construction until after the British dramatically increased escort production was one of the main reasons the U-boat offensive against Britain was defeated.

With the limited number of boats available, Dönitz realized only minor success in the opening months of the campaign. By May 1940, sinkings from U-boat attacks in the Atlantic totalled 148 ships of 678,130 GRTs. Even when additional shipping losses were added from mines and smaller U-boats in the inshore waters off Britain, the total attrition of shipping in no way posed a serious threat to Britain and its war effort. Compared to the losses caused by surface ships and mines, it was readily apparent to both the British and the

Germans that U-boats posed the main threat to shipping. In 1939, the British merchant fleet reached 17,984,000 GRT. Given this, the scale of losses to date was insignificant. At this point, Allied construction of new ships was covering losses.

The U-boat threat grew in the second part of 1940. During the so-called Happy Time, U-boats accounted for an average of eight ships per month/per boat. A combination of little British intelligence on U-boats, inadequate air cover, few escorts and rudimentary tactics and training made this possible. Only the fact that there were fewer than 30 U-boats at sea during this period saved the Allies from suffering truly crippling losses. However, this success was fleeting – by February 1941, the monthly average was down to two ships per month/per boat. From this point, Dönitz was forced to rely on mass attacks against convoys instead of relying on a small number of excellent commanders decimating poorly guarded convoys. In this book, and in every other account of the battle, only the convoys that came under attack are mentioned. The vast majority of convoys were not subjected to attack and thus their safe passages go unmentioned. This is borne out by the numbers. Between 1 January and 30 June 1941, 37 HX convoys set out for Britain with 1,413 ships. Of these, only 30 ships were lost – a loss rate of just over 2 per cent. Of the 91 HX convoys from late 1940 until the end of 1941, 79 were not attacked and did not suffer any losses. Even the slow 18 SC convoys suffered little – only 11 of 576 ships were lost, about the same rate of loss. Overall, from SC 8 until SC 62 at the end of 1941, 46 of 56 convoys suffered no losses at all. For the 19 SL convoys, 26 of 750 ships were sunk (over 3 per cent loss). Of the 340 ships in HG convoys, 10 were lost (3 per cent). Losses to westbound convoys were always lower. A total of 109 OB and OG convoys transited during this period; of the 3,307 ships, 33 were sunk for a loss rate of less than 1 per cent.

During the final six months of 1941, the Allies successfully defended their North Atlantic convoys. Escorts for HX convoys were the most successful – of 1,560 ships in 31 convoys, only two were damaged. As had been the case since their inception, the slow SC convoys were the most vulnerable. Of the 1,187 ships in 27 such convoys, 35 were lost. Even this represented only a 3 per cent loss rate. On a smaller scale, the 17 SL convoys suffered a proportionately greater loss rate of 4 per cent (15 ships sunk out of 359).

Losses to outbound convoys in the North Atlantic were historically lower, and this remained true in the second half of 1941. Of the 2,537 ships

steaming in 60 OB and ON convoys, a mere three were sunk. Proportionally, the highest losses were suffered by the HG and OG convoys. In 11 such convoys with 509 ships, 32 were lost (just over 6 per cent). Finally, on 15 OS convoys, with 574 merchants, only eight were lost.

Although worldwide losses of merchant ships in 1941 added up to 1,299 ships (of which 833 were British), new construction in Britain and the addition of foreign-flagged ships meant that there was a net tonnage gain in Britain's merchant fleet over the second half of 1941 of 249,000 GRT. At the end of 1941, the size of Britain's merchant fleet was larger than it had been at the start of the war. Including British flag ships and foreign flag ships under British control, 3,616 ships were available of some 20,693,000 GRT. This fleet was able to import 44,586,000 GRT into Britain in 1941. Although lower than pre-war levels, and low enough to force the rationing of some items, this was sufficient to meet basic requirements. Germany's plan to blockade Britain was failing.

By mid-November 1941, virtually all German naval operations in the North Atlantic ceased. The Allies used the second half of the respite in 1941 to good effect by reinforcing defences in the North Atlantic, which was always the most important area of the Atlantic campaign. By the end of 1941, the British appeared on the verge of victory. In December of that year, the US entered the war, making Britain's long-term prospects excellent. Now the U-boats were facing the combined resources of the two largest maritime powers on the planet.

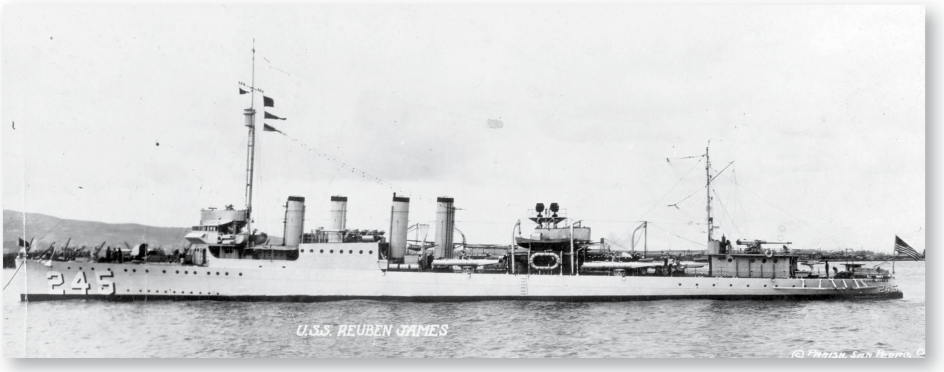
WERE THE ALLIES ON THE VERGE OF VICTORY AT THE END OF 1941?

Books on the Atlantic campaign focus on the operations and losses caused by U-boats and often fail to give the RN a similar degree of attention. After an uneven beginning, by the end of 1941, the RN (with the often-overlooked assistance of the RCN and the USN) had forced Dönitz onto the back foot and looked ready to throttle the U-boat offensive. In June 1941, the RN and the RCN had grown exponentially since the start of the war – 248 destroyers and escort destroyers were in service with another 157 under construction; 99 corvettes were in service, with another 44 under construction in Britain and 52 in Canada. The very successful sloops (and similar US Coast Guard

cutters given to the British) totalled 48 in service with three more being built. Coastal waters were covered by 300 ASW trawlers with 47 more under construction.

Not only were the numbers of escorts much greater than at the start of the war, but they were more effective. Permanent escort groups were showing their worth. Training and leadership in the escort groups were all much improved. In addition, tactical improvements made the escorts more deadly. Radio–telephone communications provided a much quicker response to U-boat attack. The switch from five to ten depth charge patterns made it more likely that a U-boat would be sent to the bottom of the ocean.

At the start of the war, Coastal Command was unable to find or attack U-boats. These problems were not overcome until late 1941, making the waters of the Atlantic within range of British aircraft a much more dangerous place for German submarines. This is an Armstrong Whitworth Whitley Mark VII bomber, converted into a maritime patrol aircraft, conducting an attack on a surfaced U-boat on 1 December 1941. A total of 146 Whitley Mark VIIs saw service in four Coastal Command squadrons. (Naval History and Heritage Command)



USS *Reuben James* was a Clemson-class destroyer commissioned in 1920. Many of these dated ships were still in commission in 1941. As part of the escort of Convoy HX 156, it was torpedoed by *U-552*. The resulting explosion of the forward magazine broke off the ship's bow. After only a few minutes, the stern section also sank. Of the crew of 144, only 44 survived. (Naval History and Heritage Command)

Equally important as the growth of the escort force was Coastal Command's turnaround from the start of the war. This was evident by mid-1941. Operating from bases in Britain and Iceland, it had some 200 aircraft patrolling at farther distances. These included 80 Hudsons, 36 Catalinas and 10 Liberators. In addition, Sunderlands, Wellingtons and old Whitleys were still in service. This force flew missions 700nm from Britain and 400nm from Iceland, while the RCAF monitored waters out to 600nm from Canada. This left an air gap of 300nm in the mid-Atlantic. From July 1941, it took 18 months to close it. It became the centre of operations in 1942 and for the first half of 1943.

For the British, the way ahead for 1942 appeared clear. Convoys were the best method of protecting shipping, and by massing escorts and aircraft for their protection, U-boats were increasingly at risk. If escort carriers and long-range aircraft could enter the battle in significant numbers, the defence of convoys would be greatly strengthened.

With an avalanche of British and Canadian-built escorts reaching service, and an expanded Coastal Command, all underpinned by an excellent intelligence network, the odds against the U-boats were increasing. Britain was no longer fighting alone. Since May 1941, the US had been an ally of Britain giving it enormous resources in the form of Lend-Lease and even escorting convoys in huge swathes of the Atlantic. In December 1941, with the US in the war on a formal basis, it became impossible for the Germans to achieve victory in the Atlantic.

Dönitz's prospects for 1942 did not look promising. The favourable trend he did have was increased U-boat production that by 1942 would provide him with the 300 boats he stated in 1939 were necessary to win the campaign in the Atlantic. With this number of submarines, he might have the capability to find convoys and mass enough U-boats against them to overwhelm their defences. Before this theory could be tested, the American entry into the war provided Dönitz with an opportunity that he was quick to seize. A second Happy Time was on the horizon.

FURTHER READING

Books on the Atlantic campaign abound, ranging from overviews to focused works on specific battles, platforms or technologies. These are among the most useful and are recommended for further reading.

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www.uboat.net

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Mark Stille is the author of numerous Osprey titles focusing on naval history in the Pacific. A career in the intelligence community spanning nearly 40 years saw him undertake tours on the faculty of the Naval War College, on the Joint Staff and on US Navy ships. He received his BA in History from the University of Maryland and also holds an MA from the Naval War College.

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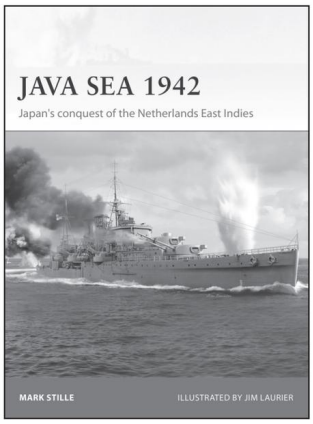
Jim Laurier is a native of New England and lives in New Hampshire. He attended Paier School of Art in Hamden, Connecticut, from 1974 to 1978, graduating with Honors. Jim has been commissioned to paint for the US Air Force, and has aviation paintings on permanent display at the Pentagon.

Other titles in the series



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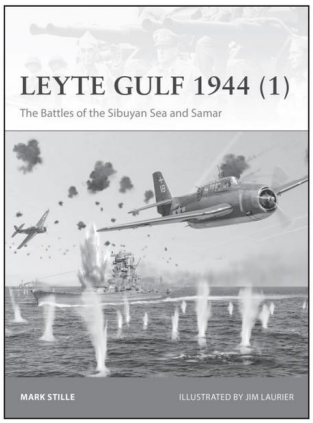

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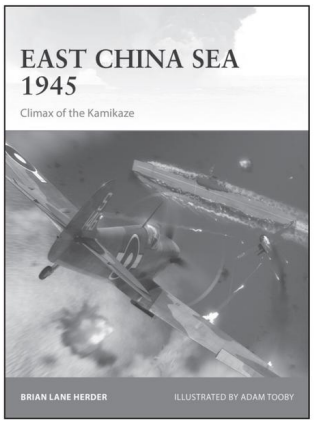

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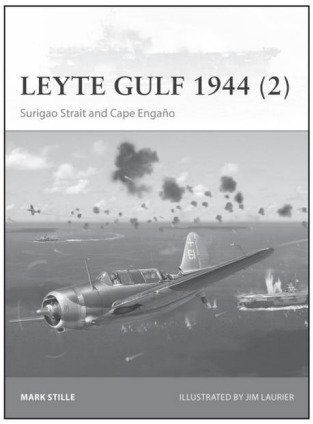

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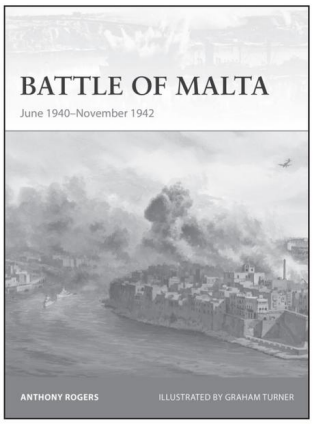

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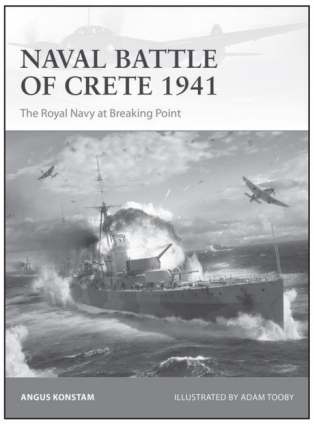

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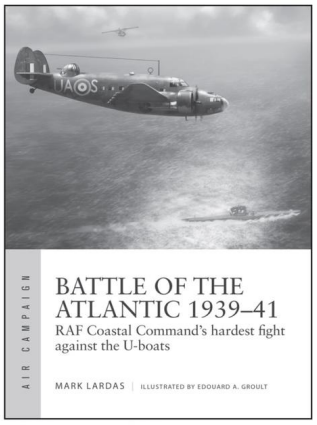
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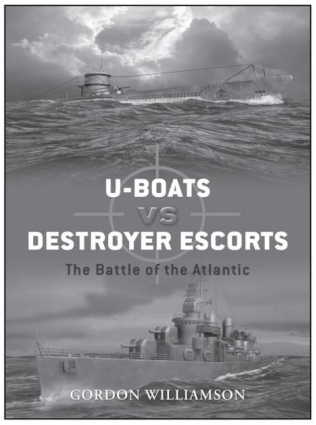

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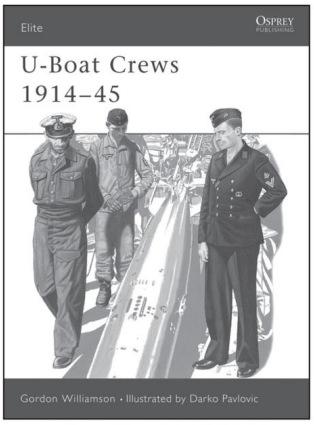

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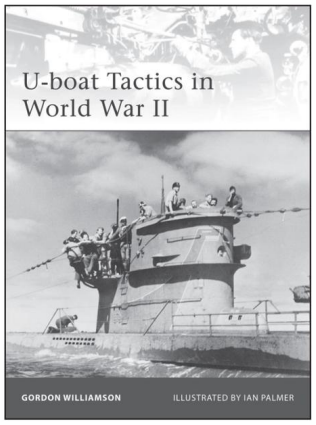

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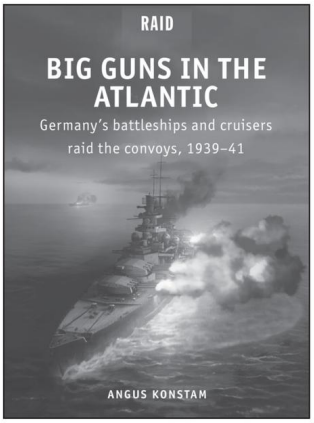

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OSPREY PUBLISHING
Bloomsbury Publishing Plc
Kemp House, Chawley Park, Cumnor Hill, Oxford OX2 9PH, UK
29 Earlsfort Terrace, Dublin 2, Ireland
1385 Broadway, 5th Floor, New York, NY 10018, USA
E-mail: **info@ospreypublishing.com**
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First published in Great Britain in 2024
This electronic edition published in 2024 by Bloomsbury Publishing Plc.

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A catalogue record for this book is available from the British Library.

PB ISBN: 9781472861368
eBook ISBN: 9781472861337
ePDF ISBN: 9781472861344
XML ISBN: 9781472861351

Maps by **www.bounford.com**
3D BEVs by Paul Kime
Typeset by PDQ Digital Media Solutions, Bungay, UK

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Title page image: All 24 Type VIIB boats were completed by early 1940, making them a mainstay in the opening phases of the Atlantic campaign. (Naval History and Heritage Command)